

**Site Inspection
Sampling and Analysis Plan**

**M. Stephens Manufacturing, Inc.
8420 South Atlantic Avenue
Cudahy, Los Angeles County, California**

**EPA ID No.: CAN000909569
USACE Contract Number: W91238-11-D-0001
Interagency Agreement No.: 95777001-0
Document Control Number: 20074.063.070.1009**

September 2015

**Prepared for:
U.S. Environmental Protection Agency
Region 9**

**Prepared by:
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List of Acronyms

| | |
|------------------|---|
| AOC | Analyte of Concern |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CPT | Cone Penetration Testing |
| CLP | Contract Laboratory Program |
| CRQL | Contract Required Quantitation Limit |
| DCE | dichloroethylene |
| DNAPL | dense non-aqueous phase liquid |
| DTSC | Department of Toxic Substances Control |
| DQO | Data Quality Objective |
| EPA | United States Environmental Protection Agency |
| ft ² | square-feet |
| GENIL | General Inspection Laboratories |
| GSWC | Golden State Water Company |
| HCl | hydrochloric acid |
| HDPE | High-Density Polyethylene |
| HNO ₃ | nitric acid |
| HRS | Hazard Ranking System |
| ICP-MS | Inductively Coupled Plasma Mass Spectrometry |
| IDW | investigation-derived wastes |
| LACSD | County Sanitation District of Los Angeles County |
| LADPW | Los Angeles County Department of Public Works |
| MCL | Maximum Contaminant Level |
| M. Stephens | M. Stephens Manufacturing, Inc. (site) |
| mL | milliliters |
| MQO | Measurement Quality Objective |
| MRL | Method Reporting Limit |
| MS/MSD | Matrix Spike/Matrix Spike Duplicate |
| NOV | Notice of Violation |
| NPL | National Priorities List |
| PA | Preliminary Assessment |
| PCE | tetrachloroethylene |
| PM | Project Manager |
| PPE | personal protective equipment |
| QA | Quality Assurance |
| QC | Quality Control |
| RCRIS | Resource Conservation and Recovery Information System |
| RPD | Relative Percent Difference |
| RSCC | Regional Sample Control Coordinator |
| RSL | Regional Screening Level |
| RWQCB | Regional Water Quality Control Board |

| | |
|--------|--|
| SAM | Site Assessment Manager |
| SAP | Sampling and Analysis Plan |
| SARA | Superfund Amendments and Reauthorization Act |
| SEMS | Superfund Enterprise Management System |
| SSA | Site Screening Assessment |
| SI | Site Inspection |
| SOP | Standard Operating Procedure |
| TCE | trichloroethylene |
| TRI | Toxics Release Inventory |
| UST | underground storage tank |
| VOC | volatile organic compound |
| WESTON | Weston Solutions, Inc. |
| µg/kg | microgram per kilogram |

1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), Weston Solutions, Inc. (WESTON®) has been tasked to conduct a Hazard Ranking System (HRS) Site Inspection (SI) of the M. Stephens Manufacturing, Inc. (M. Stephens) site in Cudahy, Los Angeles County, California. The HRS assesses the relative threat associated with actual or potential releases of hazardous substances to the environment, and has been adopted by the United States Environmental Protection Agency (EPA) to assist in setting priorities for further site evaluation and potential remedial action. The HRS is the primary method for determining a site's eligibility for placement on the National Priorities List (NPL). The NPL identifies sites where the EPA may conduct remedial actions.

This Sampling and Analysis Plan (SAP) describes the project and data use objectives, data collection rationale, quality assurance goals, and requirements for sampling and analysis activities. The SAP also defines the sampling and data collection methods that will be used for this project. The SAP is intended to accurately reflect the planned data-gathering activities for this site investigation; however, site conditions and additional EPA direction may warrant modifications. All significant changes will be documented in the final report.

WESTON has been tasked to gather and review existing, available information regarding site conditions, identify and fill data gaps, and prepare HRS scoresheets and rationale for the site.

The specific field sampling and chemical analysis information pertaining to the site is addressed in this SAP, in accordance with the EPA documents EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (QA/R-5), March 2001; Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4), February 2006; and Data Quality Objective Process for Superfund (EPA 540/G-93/71), August 1993.

1.1 Project Organization

The following is a list of project personnel and their responsibilities (see Table 1):

Table 1: Organizational Chart

| Title/Responsibility | Name | Phone Number |
|--|-----------------------|---------------------|
| EPA Site Assessment Manager | Matt Mitguard | (415) 972-3096 |
| EPA Quality Assurance Manager | Eugenia E. McNaughton | (415) 972-3411 |
| WESTON Program Manager and Quality Assurance | Christina Marquis | (818) 350-7308 |
| WESTON Project Manager | Brian Reilly | (541) 593-3800 |
| EPA Region 9 Sample Control Coordinator | Susan Sturges | (510) 412-2389 |

EPA Site Assessment Manager (SAM) - The EPA SAM is Matt Mitguard. Mr. Mitguard is the primary decision maker for this investigation and is the primary contact for the WESTON Project Manager.

EPA Quality Assurance (QA) Manager - The EPA QA Manager is Eugenia E. McNaughton, Ph.D. Ms. McNaughton will be responsible for reviewing the SAP, and arranging for data validation once sampling is completed.

WESTON Program Manager and QA Coordinator - The WESTON Program Manager and QA Coordinator is Christina Marquis. Ms. Marquis is responsible for the overall performance of all tasks assigned to WESTON by the EPA. Ms. Marquis is authorized to approve Sampling Analysis Plans for Southern California sites conducted by WESTON to ensure project quality assurance goals are met.

WESTON Project Manager (PM) - The WESTON PM is Brian Reilly. Mr. Reilly is responsible for preparing the SAP, working with the laboratories, implementing the sampling design, collecting, handling, documenting, and transporting samples, generating field documentation of sampling activities, and working with the WESTON QA Coordinator to ensure project quality assurance goals are met.

EPA Region 9 Sample Control Coordinator (RSCC) – The EPA RSCC is Susan Sturges. Ms. Sturges will determine which laboratories will perform the analyses for the project. If the Contract Laboratory Program (CLP) program will be used, the RSCC will assign CLP numbers. The RSCC will be responsible for delivering the raw data to the EPA SAM.

Analytical Laboratory - The EPA RSCC will arrange for laboratory services for metals by ISM02.2 [using Inductively Coupled Plasma Mass Spectrometry (ICP-MS)] or equivalent, and for volatile organic compounds (VOCs) by SOM02.2 or equivalent.

Data Validation – The EPA QA Office will arrange data validation for this investigation.

1.2 Distribution List

Copies of the final SAP will be distributed to the following persons and organizations:

- Matt Mitguard, EPA Region 9
- Eugenia E. McNaughton, Ph.D., EPA QA Manager
- Weston Solutions, Inc. files
- Site Owners and/or Operators, per their request.

1.3 Statement of the Specific Problem

The apparent problems at the M. Stephens site, which contributed to EPA's determination that a SI was necessary, are as follows:

- The site has been used for metal fabrication, electric parts manufacturing, tool manufacturing, and die-cast electrical parts manufacturing from approximately the late 1940s through 2003. Specific on-site activities, hazardous substances, and hazardous substance management practices are not known. Tetrachloroethylene (PCE) -containing waste was generated at the site during at least the late 1980s and in 1999 (CC, 2005; DPW, 2007; DTSC, 2013; LACSD, 1992; Weston, 2015).
- Process wastewaters generated during on-site activities were historically treated using a sub-grade clarifier system until approximately 2003; it is not known when the clarifier system was installed (DPW, 2007; Weston, 2015).
- A subsurface investigation conducted at the site in 2005 identified detectable concentrations of PCE in shallow soil beneath the site (CC, 2005).
- The site is situated upgradient with respect to the regional groundwater flow from several municipal supply wells that have been identified with elevated concentrations of volatile organic compounds (VOCs). The site is located approximately 0.17 mile north-northwest of the City of South Gate's Well 7, which was removed from service in approximately 2002 and destroyed in 2011 due primarily to elevated concentrations of contaminants, including trichloroethylene (TCE), arsenic, and chromium. The site is also located approximately 0.28 mile west-southwest of the Golden State Water Company (GSWC) - Bell/Bell Gardens system's Hoffman Well 02, which was removed from service in approximately late 2000 and destroyed in approximately October 2007 due primarily to elevated concentrations of chromium (DTSC, 2013; RWQCB, 2015; Weston, 2015).

2.0 SITE DESCRIPTION

2.1 Location and Description

The M. Stephens site is located at 8420 South Atlantic Avenue, Cudahy, California. Additional addresses associated with the site property include 8414 South Atlantic Avenue and 4727, 4805, 4817, 4831, and 4839 Patata Street. The geographic coordinates for the site are 33° 57' 22.4" North latitude and 118° 10' 59.5" West longitude (Appendix A). The location of the site is shown in Figure 1.

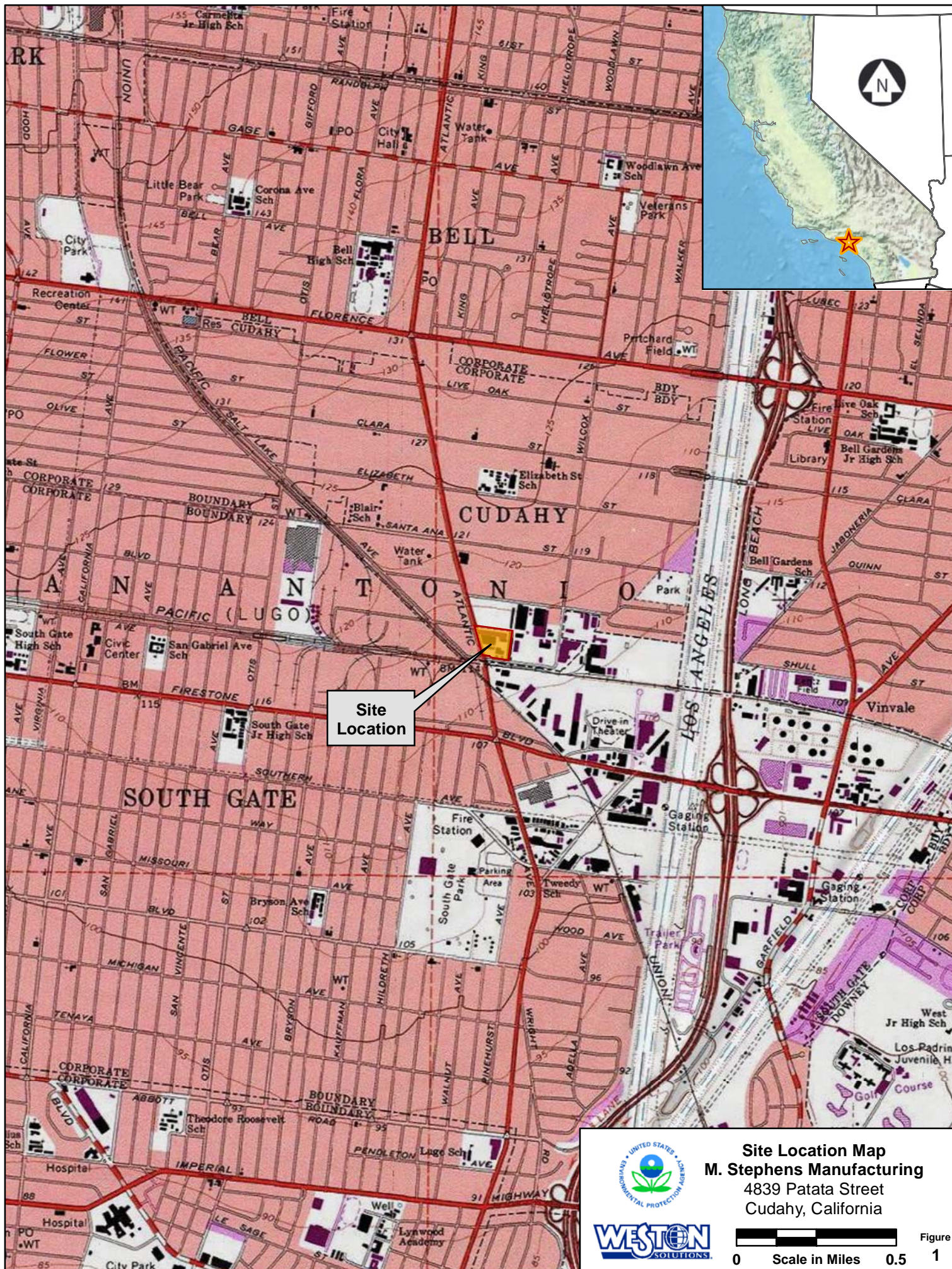
The M. Stephens site occupies approximately 5.9 acres in an urban industrial area. The site is bordered to the north by a tractor trailer service station [Spirit (ITL Inc.) Truck Stop], a trucking company (R Espinoza Trucking), and a door/roof hatch/skylight manufacturing facility (Dur-Red). The site is bordered to the west across S. Atlantic Avenue by a commercial fueling station (Roche Fuel Stop), a non-destructive testing facility and commercial retail spaces [General Inspection Laboratories (GENIL) site - EPA ID No.: CAD027897164]. The site is bordered to the south by the Southern Pacific railroad easement with a freight distribution terminal (Performance Team Freight Systems) beyond. The site is bordered to the east by the Cudahy Industrial Center (various light industrial suites, fitness, etc.) (Weston, 2015).

This site is composed of eight distinct Los Angeles County Assessor Parcels, which are identified as: 6224-034-010, -014, -032, -036, -037, -039, -040, and -041. As of August 2015, the only significant structure at the site was the former M. Stephens Manufacturing Building, which occupied approximately 19,400 square-feet (ft²) at the southwestern portion of the site. A heavily-weathered asphalt-paved parking lot was located adjacent-south to the building and several utility poles were located throughout the property. With the exception of the parking lot, the surface of the site was covered in a mixture of weathered concrete, asphalt, and exposed soil. The parcel layout and site layout are shown in Figure 2 and Figure 3, respectively (DTSC, 2013; Weston, 2015).

The site has been developed since at least 1923, at which time it was occupied by agricultural fields and single-family residential buildings. Between 1938 and approximately 1950, the northern and eastern portions of the site were redeveloped to accommodate several manufacturing, warehousing, and office buildings. Industrialization of the site continued through the 1950s and early 1960s, and by 1966 only a single residential building remained alongside at least 13 distinct industrial buildings. By 1972, the remaining residential building was removed and there were no significant changes in the configurations of the on-site buildings until approximately 1987, at which time the existing M. Stephens Manufacturing Building was constructed at the former location of a smaller warehouse building. With the exception of the existing building, all of the significant structures at the site were removed between July 2008 and June 2009. The historic site layout is shown in Figure 4 (Weston, 2015).

At least three underground storage tanks (USTs) were historically located at the site. An approximately 1,500-gallon UST and a 500-gallon UST, as well as an oil-filled car-hoist, were located at the southeastern portion of the site adjacent south to the former Jackson Iron Works Building. These two USTs were removed in November 1989 and the car-hoist was removed in


August 1995. An additional 10,000-gallon UST was historically located adjacent south of the southeastern corner of the existing M. Stephens Manufacturing Building. This tank was removed at an unidentified date prior to 1992. A subgrade clarifier was historically located approximately 115 feet northeast of the existing M. Stephens Manufacturing Building. The clarifier was removed in May 2007 (DPW, 2007; Weston, 2015).











Legend

 Property Boundary

  0 Scale in Feet 200

Site Layout Map
M. Stephens Manufacturing
4839 Patata Street
Cudahy, California



2.2 Operational History

The M. Stephens site is currently owned by three corporate entities that include: the Cudahy Economic Development Corporation, which owns the four southwestern parcels (6224-034-014, -032, -040, and -041); Tssay J and R LLC, which owns the two eastern parcels (6224-034-010 and -036); and Patata Investments LLC, which owns the two northern parcels (6224-034-037 and -039). Tssay J and R LLC and Patata Investments LLC are affiliated real estate investment corporations and may act as a single entity as they share a primary owner. The site has been owned by various real estate investment corporations since approximately 1997, which include, but may not be limited to: BBA Southwood LLC, Carmar LLC, Patata Streets LLC, and Agora Realty & Management. Between approximately December 1986 and December 1996, the site was owned by M. Stephens Manufacturing Inc./BWF Manufacturing. Ownership information prior to 1986 is not known (DTSC, 2013; Weston, 2015).

Historic operations at the site include residential and agricultural activities from approximately 1900 to the late 1940s; metal fabrication, electric parts manufacturing, and tool manufacturing from approximately the late 1940s through the mid-1980s; and die-cast electrical parts manufacturing from approximately 1986 through 2003. With the exception of some miscellaneous storage of tractor-trailers in late 2009, there have been no known operations conducted at the site since 2003 (Weston, 2015).

At the easternmost portion of the site, including the entirety of parcel 6224-034-010, the Jackson Iron Works metal fabrication facility operated from approximately the late 1940s to at least 1971. No additional significant information is known regarding specific on-site operations or hazardous substances associated with these metal fabrication activities. Grating Pacific, Inc. and Plasma Specialists, Inc. also conducted metalworking activities at this portion of the site between approximately 1981 and 1986. Jackson Iron Works, Grating Pacific, and Plasma Specialists were addressed at 4831 Patata Street (Weston, 2015).

At the southeastern portion of the site, the southern portion of parcel 6224-034-036 was historically used by the Patata Engineered Wire & Metal Manufacturing Company for metal fabrication activities in the early 1950s and by the Automatic Instrument Service Company for the repair of instrument control devices in the late 1950s through mid-1960s. Both of these businesses were addressed at 4727 Patata Street (Weston, 2015).

At the central portion of the site, the northern portion of parcel 6224-034-014 and the central portion of 6224-034-036 were historically used by the Martin Electric Motors company to conduct electric parts service and sales operations during the early 1950s through mid-1960s. The adjacent Jackson Iron Works facility apparently expanded into this area during the mid-1960s and utilized at least two large overhead crane-ways. Martin Motors was addressed at 4817 Patata Street in at least 1951 (Weston, 2015).

At the southwestern portion of the site, the entirety of parcel 6224-034-032 and the southern half of parcel 6224-034-041 were used by the Martin Motors company for electrical equipment storage from the mid-1950s through at least the late 1960s. On-site electrical equipment appears to have

included electrical transformers. Martin Motors was addressed at 4805 Patata Street from at least 1958 through 1967 (Weston, 2015).

At the west-central and northern portions of the site; which includes the entirety of parcels 6224-034-037, -039, and -040 as well as the northern sections of parcels 6224-034-010, -036, and -041; the property was used for machining, aluminum casting, and retail operations during the 1950s and into the early 1960s. From 1958 to at least 1962, machining operations were conducted by the Greer Machine Company, which was addressed at 8414 Atlantic Ave. From approximately 1962 to the mid-1970s, the area was used for tool manufacturing by the Pratt & Whitney Tool Division of Colt Industries. From approximately the mid-1960s to the mid-1980s, the area was used for tank manufacturing by Trico Superior (until 1980) and then by the Sierra Tank and Construction Company. Pratt & Whitney, Trico, and Sierra Tank were typically addressed at 8420 Atlantic Avenue (TSD, 1980; Weston, 2015).

In 1986, operations across the entirety of the site were converted over to the manufacturing of metal electrical equipment; primarily die-cast, weatherproof, outlet boxes; by the M. Stephens Manufacturing Company. M. Stephens Manufacturing, along with their BWF product line, was acquired by Intermatic, Inc. in 1997. In 2003, on-site operations were discontinued and consolidated into Intermatic's facility in Tijuana, Mexico. M. Stephens/BWF was later acquired by the Teddico Electrical Company; however the specific details of this acquisition are not known. M. Stephens was typically addressed at 8420 Atlantic; however, 4839 Patata also appears to have less frequently been used as the facility address. PCE-containing waste was generated at the site in at least the late 1980s and in 1999 (DTSC, 2013; Weston, 2015).

Three USTs were historically used to store gasoline and/or oil in association with on-site operations. In addition, an oil-filled car-hoist was used during operations as well as several overhead crane-ways that likely utilized some form of hydraulic oil. The USTs, car-hoist, and crane-ways appear to have been removed from regular service by 1986 when M. Stephens Manufacturing initiated on-site operations. No additional information is known regarding the specific use of on-site USTs. Unaltered petroleum products, as well as any substances that are purposefully added to the indigenous petroleum product during the refining process, are excluded from consideration under CERCLA (CC, 2005; DPW, 2007; Weston, 2015).

A subgrade clarifier was historically used in on-site operations between at least 1978 and 2003. The clarifier received wastewater from the facility and, under permit, discharged effluent to the sanitary sewer system. The clarifier system was used by at least Trico Superior and M. Stephens Manufacturing. No additional information is known regarding the influent waste-streams associated with this clarifier (CC, 2005; TSD, 1980; Weston, 2015).

In September 2005, a Limited Phase II Environmental Site Assessment (ESA) was conducted at the site by an outside company in association with a potential real estate transaction. This ESA included the collection of subsurface soil matrix samples at 11 locations across the site. Detectable concentrations of PCE were identified in a shallow soil sample collected from adjacent to the former clarifier and in a shallow soil sample collected from a location approximately 70 feet west of the clarifier. No additional elevated concentrations of VOCs or metals were reported during the

investigation. Additional details on the 2005 ESA investigation are provided in Section 3.0 (CC, 2005).

No additional information is known regarding specific on-site historic operations, hazardous substances, or hazardous substance management practices. With the exception of the 2005 ESA and the soil matrix sampling that occurred during UST removal activities, no known soil vapor, soil matrix, or groundwater sampling has been conducted at the site.

Table 2: Current and Historic On-site Operators

| Location | Operator | Primary Operations | Date |
|--|-------------------------------------|----------------------------------|--------------|
| East Site (6224-034-010) | Jackson Iron Works | Metal fabrication | ~1948 ~ 1971 |
| | Grating Pacific | Metal fabrication | ~1981 - 1986 |
| | Plasma Specialist | Metal fabrication | ~1981 - 1986 |
| Southeast Site [6224-034-036 (south)] | Patata Engineered Wire & Metal Mfg. | Metal fabrication | ~1952 |
| | Automatic Instrument Service | Instrument Control Device Repair | ~1958 ~ 1965 |
| Central Site [6224-034-014 (north); 6224-034-036 (central)] | Martin Electric Motors | Electric Parts Service and Sales | ~1952 ~ 1965 |
| | Jackson Iron Works | Metal fabrication | ~1965 |
| Southwest Site [6224-034-032; 6224-034-041 (southern)] | Martin Electric Motors | Electric equipment storage | ~1955 ~ 1968 |
| Northern and west-central Site [6224-034-037, -039, -040; 6224-034-010, -036, -041 (northern)] | Greer Machine Company | Machining and aluminum casting | ~1955 ~ 1962 |
| | Pratt & Whitney Tool Co. | Tool Manufacturing | ~1962 ~ 1975 |
| | Trico Superior | Metal Tank Manufacturing | ~1965 - 1980 |
| | Sierra Tank & Construction Co. | Metal Tank Manufacturing | 1980 ~ 1985 |
| Site-wide | <i>Unknown</i> | Residential and Agriculture | ~1900 ~ 1948 |
| | M. Stephens Manufacturing Co. | Metal electrical equipment mfg. | 1986 - 2003 |
| | <i>Unknown</i> | Tractor-trailer storage | 2009 |
| References: TSD, 1980; Weston, 2015. | | | |

2.3 Regulatory Involvement

2.3.1 U. S. Environmental Protection Agency

The M. Stephens site was not listed in the Resource Conservation and Recovery Information System (RCRIS) database as of December 6, 2014 (Weston, 2015).

The site is listed in the Toxics Release Inventory (TRI) database as 'M. Stephens Manufacturing Inc.' (TRI ID: 90201MSTPH8420S), addressed at 8420 S. Atlantic Avenue. The most recent release information provided in the database is from 1995 (Weston, 2015).

2.3.2 California Environmental Protection Agency, Department of Toxic Substances Control (DTSC)

The M. Stephens site is listed in the California Department of Toxic Substances Control's (DTSC) EnviroStor database as M Stephens Manufacturing (Envirostor ID: 60001790) at 4839 Patata Street. The site is listed as an 'Evaluation' site that was referred to EPA on September 17, 2013. DTSC completed a Site Screening Assessment (SSA) for the M. Stephens site in June 2013. The SSA was prepared for EPA and has a final sign-off date of September 30, 2013. DTSC has had no known additional involvement with the site (DTSC, 2013; Weston, 2015).

2.3.3 California Environmental Protection Agency, Regional Water Quality Control Board (RWQCB)

The M. Stephens site is listed in the California Regional Water Quality Control Board's (RWQCB) GeoTracker database as M Stephens Manufacturing (GeoTracker ID: T0603703809; Case No. 1-11513) at 4839 Patata St. The site is listed as a 'LUST Cleanup Site' with a cleanup status as 'Completed – Case Closed as of 9/27/1995.' The potential contaminant of concern is listed as 'gasoline' and the potential media affected is 'soil.' Between at least 1978 and 1980, the RWQCB, in conjunction with the County Sanitation District of Los Angeles County (LACSD), conducted oversight of the operation and monitoring of waste discharges to the on-site clarifier (TSD, 1980; Weston, 2015).

2.3.4 Los Angeles County Department of Public Works (LADPW)

In June 2007, the Los Angeles County department of Public Works (LADPW) issued a 'No Further Action' letter for the M Stephens site in regard to the closure and removal of the on-site clarifier (DPW, 2007).

2.3.5 Los Angeles County Sanitation District of Los Angeles County (LACSD)

Between at least 1978 and 2003, LACSD, in conjunction with the RWQCB, conducted oversight of the operation and monitoring of waste discharges to the clarifier at the M. Stephens site. In 1992, LACSD conducted an inspection of the site to investigate discrepancies in the number and size of on-site USTs and determined that the three known USTs had all been removed. In June 1997, LACSD issued a Notice of Violation (NOV) (Violation Notice No. 14195) to M. Stephens

Manufacturing due to wastewater being discharged to the sanitary sewer system that contained concentrations of zinc in excess of federal regulations. In December 2003, LACSD voided the Industrial Wastewater Discharge Permit for the site (Permit No. 14831) due to the company having ceased all industrial wastewater producing activities (TSD, 1980; Weston, 2015).

2.4 Geology/Hydrogeology

The M. Stephens site lies within the Central Subbasin in the Coastal Plain of the Los Angeles Groundwater Basin. The Central Subbasin is generally bound to the north by the folded, uplifted and eroded Tertiary basement rocks of the La Brea High surface divide; to the northeast and east by the less permeable Tertiary rocks of the Elysian, Repetto, Merced, and Puente Hills; to the southeast by the Coyote Creek flood control channel (approximate Los Angeles County/Orange County boundary); and to the southwest by the Newport Inglewood Uplift, a regional anticline associated with the Newport Inglewood fault system. The subbasin has historically been further divided into four areas; the Los Angeles Forebay at the northwest, the Montebello Forebay at the north, the Whittier Area at the northeast, and the Pressure Area at the central and southwest. The forebays are characterized by generally unconfined and relatively interconnected aquifer systems. The Montebello Forebay, as well as the Los Angeles Forebay to a lesser degree, serves as the primary groundwater recharge area for both shallow and deep aquifers across the entirety of the subbasin. The Central Basin Pressure Area is characterized by generally confined aquifer systems separated by relatively impermeable clay layers, although semipermeable zones within these layers allow aquifers to be interconnected in some areas. The Los Angeles and San Gabriel rivers pass across the surface of the Central Basin, primarily by way of engineered concrete channels, on their way to the Pacific Ocean. The average net annual precipitation in the subbasin is approximately 12 inches (DWR, 1961; DWR, 2004).

The M. Stephens site is located within the northern portion of the Central Basin Pressure Area with the Los Angeles Forebay to the northwest and the Montebello Forebay to the northeast. Throughout the Pressure Area, groundwater occurs in Holocene alluvium, the upper Pleistocene Lakewood Formation, and the lower Pleistocene San Pedro Formation. The aquifers underlying the site are, in descending order: the Gaspar, Exposition, Gage/Gardena, Jefferson, Lynwood, Silverado, and Sunnyside. Underlying the Recent alluvium, which includes the Gaspar aquifer, sediments of the upper Pleistocene Lakewood Formation, which includes the Exposition and Gage/Gardena aquifers, are present to a depth of approximately 300 to 400 feet bgs. Sediments of the lower Pleistocene San Pedro Formation, which includes the Lynwood through Sunnyside aquifers, unconformably underlie the Lakewood Formation and extend to a depth of approximately 1,300 feet bgs. The regional groundwater flow direction within the subbasin, which was calculated using data from wells screened within the upper San Pedro Formation (Lynwood through Silverado aquifers), is generally to the southwest with local and temporal variations from approximately west to southeast. Based upon data collected between 2007 and 2013, flow within these deeper aquifers in the vicinity of the site trended towards the southwest with temporal variations from west to south-southwest (DWR, 1961; DWR, 2004; WRD, 2014).

Throughout much of the subbasin, the Pleistocene-age aquifers are under confined conditions due to the presence of fine-grained, low-permeability interbedded sediments. Although these fine-grained sediments, or aquicludes, generally restrict the downward migration of groundwater from

overlying aquifers, semipermeable zones within the aquicludes allow aquifers to be interconnected in some areas. In addition, hydrogeologic modeling of multi-aquifer systems similar to that found in the Central Basin Pressure Area, have concluded that groundwater wells screened across multiple aquifers (or wells with improperly constructed annular seals that cross multiple aquifers) can act as a direct pathway for the migration of significant volumes of shallow groundwater into deep confined aquifers when vertical hydraulic head variations create a downward hydraulic gradient. The process of this downward migration is increased in areas where the deeper aquifers have periods of high-volume pumping such as seasonal demand. Furthermore, additional studies have shown that liquids that are denser than water [i.e., dense non-aqueous phase liquids (DNAPLs), such as TCE and PCE], can migrate downward through a multi-aquifer well even when vertical hydraulic head variations create an upward hydraulic gradient. As of the end of the 2012-2013 fiscal year, there were 537 known extraction wells (306 active and 231 inactive) within the subbasin (AwwaRF, 2006; DWR, 1961; DWR, 2013; Johnson et al., 2011).

Aquifer interconnection within two miles of the site has been documented between the Gaspar through Gage/Gardena and between the Jefferson through Silverado. Aquifer interconnection between the Gage/Gardena and Jefferson, and between the Silverado and Sunnyside, has not been documented within two miles of the site. However, due to the relatively large number of older and poorly documented groundwater wells within the subbasin, including numerous wells that are screened across multiple aquifers and may be acting as conduits between these aquifers, interconnection between the Gage/Gardena and Jefferson, and between the Silverado and Sunnyside, is projected for HRS purposes (DWR, 1961; DWR, 2004; DWR, 2013).

The shallow groundwater flow direction in the vicinity of the M. Stephens site is not known. At the adjacent GENIL site (EPA ID No.: CAD027897164), shallow groundwater flow directions calculated using existing monitoring wells have been conflicting with reported flow directions varying from north to south. During on-site subsurface investigations, groundwater was not encountered to the total explored depth of 55 feet bgs; however, during groundwater investigations at the adjacent GENIL site, the depth to first groundwater has been generally reported at approximately 50-55 feet bgs. Based on this information, the depth to groundwater at the M. Stephens site is estimated to be approximately 60 feet bgs. The geologic materials encountered during on-site investigations were reported to be primarily composed of poorly-graded fine sands with interbedded minor lenses of silt and clay (AI, 1995; CC, 2005; Weston, 2015).

2.5 Previous Sampling

In November 1989, the two USTs formerly located at the southeastern portion of the M. Stephens site were excavated and removed. Three confirmation soil samples were collected from the base of the excavation but a sample was not collected from the former dispenser area. In February 1994, at the direction of the RWQCB, soil samples were collected from the dispenser area, which exhibited elevated concentrations of petroleum hydrocarbons. In March 1995, an additional subsurface investigation was conducted to further delineate the extent of the hydrocarbon contamination, which included the advancement of three borings to a total depth of approximately 55 feet bgs. The former car-hoist was discovered during this investigation and in August 1995, the car-hoist and approximately 184 cubic yards of petroleum-impacted soil were excavated and removed. All confirmation samples exhibited petroleum hydrocarbon concentrations below

project-specified action levels. Groundwater was not encountered during the UST investigations. Unaltered petroleum products, as well as any substances that are purposefully added to the indigenous petroleum product during the refining process, are excluded from consideration under CERCLA (AI, 1995).

In September 2005, a Limited Phase II ESA was conducted at the M. Stephens site by an outside company in association with a potential real estate transaction. This ESA included the collection of 39 subsurface soil matrix samples at 11 locations across the site. Of the 11 locations, two were located adjacent to the former clarifier, one was located approximately 70 feet west of the former clarifier, one was located in the south-central portion of the site, one was located at the southeastern portion of the site (southern portion of former Jackson Iron Works Building), and six were located in the vicinity of the northern site boundary. At each location, borings were advanced to 15 feet bgs and attempt was made to collect samples at 2, 5, 10, and 15 feet bgs. In total, 39 samples were collected, 12 of which were submitted to a laboratory and selectively analyzed for petroleum hydrocarbons, metals, VOCs, semi-volatile organic compounds, and pH. The remaining 27 samples were archived and were not analyzed. PCE was identified in the 5-foot bgs sample collected from adjacent north to the former clarifier at a concentration of 6.7 micrograms per kilogram ($\mu\text{g/kg}$). PCE was also identified in a sample collected from 2-foot bgs at a location approximately 70 feet west of the former clarifier at a concentration of 5.9 $\mu\text{g/kg}$. The residential Regional Screening Level (RSL) for PCE is 24,000 $\mu\text{g/kg}$. Elevated, but relatively low, concentrations of petroleum hydrocarbons were also identified in on-site soils. No additional elevated concentrations of VOCs or metals were reported during the investigation (CC, 2005).

No additional soil vapor, soil matrix, or groundwater sampling investigations have been identified in connection with the site.

Table 3: Summary of Selected On-Site Soil and Groundwater Investigations

| Site Location | Investigation | Maximum Results | |
|--|---------------------------|---|-------------|
| | | Soil | Groundwater |
| Site-wide | 2005 Limited Phase II ESA | PCE = 6.7 µg/kg (5 ft-bgs adjacent north to former clarifier) PCE = 5.9 µg/kg (2 ft-bgs ~70 ft west of former clarifier) | -- |
| ESA = Environmental Site Assessment ft-bgs = feet below ground surface PCE = tetrachloroethylene | | µg/kg = micrograms per kilogram -- = media not sampled Note: PCE RSL is 24,000 µg/kg | |
| References: CC, 2005 | | | |

2.6 Waste Characteristics

Potential hazardous substance sources associated with the M. Stephens site include, but may not be limited to: on-site soils contaminated with VOCs and/or metals as a result of historic on-site operations (CC, 2005; DTSC, 2013; Weston, 2015).

2.7 HRS Pathways

Based on the historic operations conducted at the M. Stephens site, the known hazardous substances utilized during these operations, and the limited analytical data collected during on-site subsurface investigations, there is evidence to indicate that a release of hazardous substances may have occurred from one or more sources at the site to shallow groundwater. The depth to shallow groundwater at the site is estimated to be approximately 60 feet bgs. The shallow groundwater flow direction at the site has not been adequately determined. Based upon recently collected data, flow within the deeper regional aquifers in the vicinity of the site trended towards the southwest with temporal variations from west to south-southwest. The geologic materials in the unsaturated zone between ground surface and the top of the aquifer are estimated to be composed of fine sands with interbedded silts and clays. At least 10 distinct water purveyors operate up to 167 municipal drinking water wells within 4 miles of the site. The nearest of these wells, Well 03, is an active well maintained by the Tract 349 Mutual Water Company and is located approximately 0.26 mile northwest of the site. Routine water quality sampling of this well has not reported elevated concentrations of contaminants of concern. At least 85 former wells have been abandoned or destroyed within 4 miles of the site. The City of South Gate's Well 7 was located approximately 0.17 mile south-southeast of the site and was removed from service in approximately 2002 due to elevated concentrations of TCE, arsenic, and chromium. In addition, GSWC - Bell/Bell Gardens system's Hoffman Well 02 was located approximately 0.28 mile east-northeast of the site and was removed from service in approximately 2000 due to elevated concentrations of chromium (AI, 1995; CC, 2005; RWQCB, 2015; Weston, 2015; WRD, 2014).

Surface water runoff from the M. Stephens site is expected to infiltrate into the unpaved surfaces of the site with the excess flowing into curbside municipal stormwater drains located on adjacent public roadways (i.e., Atlantic Ave. and/or Patata St.). The nearest surface water body to the site is the Los Angeles River, which is located approximately 0.5 mile east. The Los Angeles River is highly modified, having been lined with concrete along a majority of its length by the U.S. Army Corps of Engineers in the 1950s. Flows in the river are dominated by urban runoff and tertiary-treated effluent from several municipal wastewater treatment plants. The river empties into the Pacific Ocean at San Pedro Bay approximately 13.5 miles downstream of the site. There are no surface water intakes, fisheries, or sensitive environments associated with the Los Angeles River downstream of the site; however, there is a potential for fisheries and/or recreational areas to exist within San Pedro Bay (RWQCB, 1994; Weston, 2015).

As of August 2015, there were no residences, schools, or daycare facilities located on the M. Stephens site. The nearest residential property to the site was located approximately 0.18 mile north. No sensitive environments were located on the site and the majority of the surface of the site appeared to be either unpaved or heavily-weathered asphalt with minor amounts of vegetation. The site appeared entirely fenced and generally inaccessible to the public. There were no active

operations at the site and the total number of employees working at the site was zero (DTSC, 2013; Weston, 2015).

3.0 PROJECT OBJECTIVES

3.1 Project Task and Problem Definition

WESTON has been tasked to conduct sampling at the M. Stephens site in order to characterize soils and groundwater to further the HRS process. To document an on-site hazardous substance source, soil matrix samples will be collected in the vicinity of the areas of the site that are known to have used and/or stored Analytes of Concern (AOCs). Soil matrix samples will be submitted for laboratory analysis for VOCs and metals. To establish an observed release to groundwater, groundwater samples will be collected and submitted for laboratory analysis of VOCs and metals. It is not necessary to analyze soil or groundwater samples for chromium(VI) since EPA currently assumes, for conservative HRS scoring purposes, that all chromium in groundwater is of the chromium(VI) species.

3.2 Data Use Objectives

Data collected during this site investigation will be used to:

- Determine the concentrations of VOCs and metals in on-site soils to document the presence of one or more hazardous substances sources.
- Determine the concentrations of VOCs and metals in groundwater beneath the site and directly adjacent to the site to document if an observed release from the site to groundwater has occurred.
- Evaluate whether further HRS characterization of the site is necessary. If additional characterization of the site is indicated, an addendum will be made to this SAP that documents these findings and provides a design and procedures for additional site characterization. The SAP Addendum will be submitted to the EPA QA Manager for approval.

If on-site soils are found to be contaminated by VOCs and/or metals, then the presence of hazardous substances in the source will be documented. If groundwater samples are also found to be contaminated with corresponding VOCs and/or metals above the corresponding action levels, an observed release will be documented and integrated into the site's HRS score.

3.3 Action Levels

In accordance with the HRS, the action levels to establish an observed release to groundwater, as well as to establish an on-site source of contaminated soil, are significantly above background concentrations. "Significantly above background" is defined as three times the background concentration for all media. If the background concentration is below the analytical quantitation limit, then the default background level is the background sample quantitation limit; "significantly above background" for this scenario is defined as a detect in the media where the analyte was not detected in the background media. Groundwater samples will be collected in the upgradient direction of the site with respect to the estimated groundwater flow direction to determine these

background levels. One or more soil background samples will be collected from location(s) deemed to have a lower potential for elevated concentrations of AOCs

Based on the regulatory and operational history of the site as discussed in Section 2.2, and information collected during previous investigations conducted at the site as discussed in Section 2.3; VOCs and metals are the constituents deemed most likely to be elevated above background levels. The HRS will evaluate groundwater data as compared to federal Maximum Contaminant Levels (MCLs) for drinking water. The data will also be compared to State of California MCLs for drinking water. Soil data collected from the sites can be compared to EPA Region 9 residential and industrial Regional Screening Levels (RSLs).

3.4 Decision Rules

Decisions will be based primarily on data generated from this SAP. The decision rule is:

- If analytical results indicate that soil samples collected from the site exhibit concentrations of VOCs and/or metals above the corresponding action levels, the presence of a hazardous substance source will be documented and integrated into the site's HRS score.
- If a source of VOCs and/or metals is documented at the site, and if analytical results indicate that groundwater samples collected from the site exhibit concentrations of these substances above the corresponding action levels, an observed release will be documented and integrated into the site's HRS score.

3.5 Data Quality Objectives

3.5.1 Data Quality Objective Process

The DQO process, as set forth in the EPA document, *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, was followed to establish the data quality objectives for this project. An outline of the process and the outputs for this project are included in Appendix A.

3.5.2 DQO Data Categories

This investigation will involve the generation of definitive data for soil and groundwater (see Section 3.1). The specific requirements for this data category are detailed in Section 9. The data generated under this project will comply with the requirements for that data category as defined in *Data Quality Objective Process for Superfund*, EPA 540/G-93/71, September 1993. All definitive analytical methods employed for this project will be methods approved by the EPA.

3.5.3 Measurement Quality Objectives (MQOs)

Measurement Quality Objective goals (MQOs) for this project were developed following guidelines in *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5 Final. All sampling will be guided by procedures detailed in Section 6.2 and standard operating procedures (SOPs) to ensure representativeness of sample results. Table 4 and Table 5 document the MQOs

for this project. As presented in this table, the published reporting limits for the Method Reporting Limit (MRL) (including the EPA CLP Contract Required Quantitation Limits, or CRQLs) were determined to be appropriate for this project. The acceptable ranges for Accuracy [percent recovery for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis] will fall between 75 and 125 percent for water samples and 65 and 135 percent for soil samples. The threshold of precision [Relative Percent Difference (RPD) for MS/MSD and duplicate sample analysis] will be less than or equal to 35 percent for water samples, and 50 percent for soil samples. The analytical MRLs for each analyte of concern are lower than the RSLs for soils, and lower than corresponding MCLs for water, as shown in Table 4 and Table 5. These action levels are only used as risk-based benchmarks for the purposes of validating the appropriateness of the MRLs. The Industrial RSL is likely the most applicable action level for the site; the Residential RSL is presented for reference purposes only.

| Analyte: | Method Reporting Limits | | | | Action Levels | | | |
|---|-------------------------|-----------|----------|----------|---------------|---------|-------------|---------------|
| | Water | | Soil | | Water | | Soil | |
| | Trace Water | Low Water | Low Soil | Med Soil | MCL | CRSC | RSLr | RSLi |
| | (mg/L) | (mg/L) | (mg/kg) | (mg/kg) | (mg/L) | (mg/L) | (mg/kg) | (mg/kg) |
| 1,1,1-Trichloroethane | 0.0005 | 0.005 | 0.005 | 0.25 | 0.2 | -- | 8100 | 36000 |
| 1,1,2,2-Tetrachloroethane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | 0.00034 | 0.6 | 2.7 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 40000 | 175000 |
| 1,1,2-Trichloroethane | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.0011 | 1.1 | 5 |
| 1,1-Dichloroethane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | 0.011 | 3.6 | 16 |
| 1,1-Dichloroethene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.007 | -- | 230 | 1000 |
| 1,2,3-Trichlorobenzene | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 63 | 930 |
| 1,2,4-Trichlorobenzene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.07 | 0.0023 | 24 | 110 |
| 1,2-Dibromo-3-chloropropane | 0.0005 | 0.005 | 0.005 | 0.25 | 0.0002 | 0.00002 | 0.0053 | 0.064 |
| 1,2-Dibromomethane | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.00003 | 0.036 | 0.16 |
| 1,2-Dichlorobenzene | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 1800 | 9300 |
| 1,2-Dichloroethane | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.00073 | 0.46 | 2 |
| 1,2-Dichloropropane | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.0018 | 1 | 4.4 |
| 1,3-Dichlorobenzene | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.075 | 0.012 | 2.6 | 11 |
| 2-Butanone (Methyl Ethyl Ketone) | 0.005 | 0.01 | 0.01 | 0.5 | -- | -- | 27000 | 190000 |
| 2-Hexanone | 0.005 | 0.01 | 0.01 | 0.5 | -- | -- | 200 | 1300 |
| 4-Methyl-2-pentanone (Methyl Isobutyl Ketone) | 0.005 | 0.01 | 0.01 | 0.5 | -- | -- | 5300 | 56000 |
| Acetone | 0.005 | 0.01 | 0.01 | 0.5 | -- | -- | 61000 | 670000 |
| Benzene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.0012 | 1.2 | 5.1 |
| Bromochloromethane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 150 | 630 |
| Bromodichloromethane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | 0.001 | 0.29 | 1.3 |
| Bromoform | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 19 | 86 |
| Bromomethane (Methyl Bromide) | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 6.8 | 30 |
| Carbon disulfide | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 770 | 3500 |
| Carbon tetrachloride | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.0009 | 0.65 | 2.9 |
| Chlorobenzene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.1 | -- | 280 | 1300 |
| Chloroethane (Ethyl Chloride) | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 14000 | 57000 |
| Chloroform | 0.0005 | 0.005 | 0.005 | 0.25 | -- | 0.0021 | 0.32 | 1.4 |
| Chloromethane (Freon 40) | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 110 | 460 |
| cis-1,2-Dichloroethene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.07 | -- | 160 | 2300 |
| cis-1,3-Dichloropropene | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | -- | -- |
| Cyclohexane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 6500 | 27000 |
| Dibromochloromethane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 0.75 | 3.3 |
| Dichlorodifluoromethane (Freon 12) | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 87 | 370 |
| Ethylbenzene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.7 | 0.0061 | 5.8 | 25 |
| Isopropylbenzene (Cumene) | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 1900 | 9900 |
| m,p-Xylene | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 550-m/560-p | 2400-m/2400-p |
| Methyl acetate | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 78000 | 120000 |
| Methyl tert-butyl ether (MTBE) | 0.0005 | 0.005 | 0.005 | 0.25 | -- | 0.037 | 47 | 210 |
| Methylcyclohexane | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | -- | -- |
| Methylene chloride (dichloromethane) | 0.0005 | 0.005 | 0.005 | 0.25 | 0.005 | 0.01 | 57 | 1000 |
| o-Xylene | 0.0005 | 0.005 | 0.005 | 0.25 | -- | -- | 650 | 2800 |
| Styrene | 0.0005 | 0.005 | 0.005 | 0.25 | 0.1 | -- | 6000 | 35000 |
| Tetrachloroethene (PCE) | 0.0005 | 0.005 | 0.005 | | | | | |

Notes:

Method Reporting Limits are based on the standard Contract Laboratory Program Contract-Required Detection Limit or EPA Method, statement of work.

Percent Complete for the project must be $\geq 90\%$.

Precision (RPD for MS/MSD and duplicates) should be $\leq 35\%$ for water samples, and $\leq 50\%$ for soil samples.

Accuracy for each analyte (Percent Recovery for MS/MSD) should fall between 75 and 125 % for water samples, and 65% and 135% for soil samples.

-- = No Applicable Value

CRSC = Cancer Risk Screening Concentration

MCL = Maximum Contaminant Level

mg/L = milligrams per liter.

mg/kg = milligrams per kilogram

RSLi = Regional Screening Level for Industrial Soils

RSLr = Regional Screening Level for Residential Soils

Table 5: Data Quality Indicator Goals - Inorganic Analyses

| Analyte: | Method Reporting Limits | | Action Levels | | | |
|---|-------------------------|-----------------|--|----------------|-----------------|-----------------|
| | | | Water | | Soil | |
| | Water (mg/L) | Soil (mg/kg) | MCL (mg/L) | CRSC (mg/L) | RSLr (mg/kg) | RSLi (mg/kg) |
| Metals by ICP-MS: | | | | | | |
| Aluminum | 0.02 | -- | -- | -- | 77000 | 1100000 |
| Antimony | 0.002 | 1 | 0.006 | -- | 31 | 470 |
| Arsenic | 0.001 | 0.5 | 0.01 | 0.004 | 0.68 | 3 |
| Barium | 0.01 | 5 | 2 | -- | 15000 | 220000 |
| Beryllium | 0.001 | 0.5 | 0.004 | -- | 160 | 2300 |
| Cadmium | 0.001 | 0.5 | 0.005 | -- | 71 | 980 |
| Calcium | 0.5 | -- | -- | -- | -- | -- |
| Chromium | 0.002 | 1 | 0.1 | 0.00004 | 0.3 | 6.3 |
| Cobalt | 0.001 | 0.5 | -- | -- | 23 | 350 |
| Copper | 0.002 | 1 | 1.3 | -- | 3100 | 47000 |
| Iron | 0.2 | -- | -- | -- | 55000 | 820000 |
| Lead | 0.001 | 0.5 | 0.015 | -- | 400 | 800 |
| Magnesium | 0.5 | -- | -- | -- | -- | -- |
| Manganese | 0.001 | 0.5 | -- | -- | 1800 | 26000 |
| Nickel (Soluble Salts) | 0.001 | 0.5 | -- | -- | 1500 | 22000 |
| Potassium | 0.5 | -- | -- | -- | -- | -- |
| Selenium | 0.005 | 2.5 | 0.05 | -- | 390 | 5800 |
| Silver | 0.001 | 0.5 | -- | -- | 390 | 5800 |
| Sodium | 0.5 | -- | -- | -- | -- | -- |
| Thallium | 0.001 | 0.5 | 0.002 | -- | 0.78 | 12 |
| Vanadium | 0.005 | 2.5 | -- | -- | 390 | 5800 |
| Zinc | 0.002 | 1 | -- | -- | 23000 | 350000 |
| Notes: | | | | | | |
| Method Reporting Limits are based on the standard Contract Laboratory Program Contract-Required Detection Limit or EPA Method, statement of work. | | | | | | |
| Percent Complete for the project must be >= 90%. | | | | | | |
| Precision (RPD for MS/MSD and duplicates) should be <= 35% for water samples, and <=50% for soil samples. | | | | | | |
| Accuracy for each analyte (Percent Recovery for MS/MSD) should fall between 75 and 125 % for water samples, and 65% and 135% for soil samples. | | | | | | |
| Chromium action levels are for Chromium(VI) (See Section 3.1 for explanation). | | | | | | |
| -- = No Applicable Value | | | mg/L = milligrams per liter. | | | |
| CRSC = Cancer Risk Screening Concentration | | | mg/kg = milligrams per kilogram | | | |
| ICP-MS = Inductively coupled plasma mass spectrometry | | | RSLi = Regional Screening Level for Industrial Soils, THQ=1.0 | | | |
| MCL = Maximum Contaminant Level | | | RSLr = Regional Screening Level for Residential Soils, THQ=1.0 | | | |

3.6 Sample and Data Management

Samples will be collected and logged on a chain-of-custody form as discussed in Section 8.5. Samples will be kept secure in the custody of the sampler at all times, who will assure that all preservation parameters are being followed. Samples will be transferred to the laboratory via a certified carrier in a properly custody-sealed container with chain-of-custody documentation. The SCRIBE data management system will be used to create chain-of-custody documents. The laboratory should note any evidence of tampering upon receipt.

The completed laboratory data report will be submitted to the EPA QA Manager, who will contract the data validation. The EPA QA Manager, will provide the data validation reports to the EPA SAM. The EPA SAM will then provide the data reports to the WESTON PM. The data validation reports and laboratory data summary sheets will be included in the final report to be submitted to the EPA SAM. Before submittal, the final report will undergo a technical review to ensure that all data have been reported and discussed correctly.

3.7 Schedule of Sampling Activities

The field sampling work is expected to take three days to perform. The work is tentatively scheduled to be conducted in November 2015. Access to the property will be necessary two weeks prior in order to mark the boring locations; locate private underground utilities; contact Underground Service Alert, as required by law; to identify buried utilities in public areas.

3.8 Special Training Requirements/Certifications

There are no special training or certification requirements specific to this project. Training requirements relevant to WESTON's health and safety program comply with 29 CFR 1910.120. The site-specific Health and Safety Plan is presented in Appendix B.

4.0 SAMPLING RATIONALE

4.1 Sampling Locations and Rationale

Based on the available regulatory, operational, and investigative history at the M. Stephens site, WESTON selected a sampling strategy to evaluate the levels of contamination of site AOCs in the subsurface soil and shallow groundwater beneath the site as well as in off-site locations. The proposed sampling event will include the advancement of 15 borings using direct push technology. Sample locations were selected primarily based on their proximity to areas where site AOCs have been identified to have been historically used and/or stored as well as the estimated groundwater flow direction. In addition, some locations were selected to provide a more comprehensive profile of the subsurface characteristics within the more generalized region in the vicinity of the site. Soil matrix samples will be collected from nine on-site locations. Groundwater samples will be collected from six on-site and four off-site locations. The sampling locations may be slightly modified from the proposed locations based upon actual site conditions (e.g., accessibility, underground utilities, etc.). Proposed sample locations are presented in Figure 5.

4.1.1 Soil Matrix Sampling

Soil matrix samples will be collected at each of the nine proposed on-site direct push boring locations (MSM-DP-1 through MSM-DP-9). Four of these locations; MSM-DP-1, MSM-DP-6, MSM-DP-8, and MSM-DP-9; are collocated with on-site groundwater sample locations. All nine of these locations were selected due to their proximity to areas that are suspected to have used and/or stored AOCs and include: at the approximate location of the former on-site clarifier (MSM-DP-1), at the approximate location where detectable concentrations of PCE have been previously identified in the subsurface soil (MSM-DP-2), at the approximate location of a former vapor degreaser that was potentially located at the site (MSM-DP-3), at the approximate location of the western portion of the former tool manufacturing facility (MSM-DP-4), at the approximate location of the eastern portion of the former tool manufacturing facility (MSM-DP-5), at the approximate location of a former machine shop (MSM-DP-6), adjacent northeast of the former on-site clarifier (MSM-DP-7), adjacent west of a former on-site UST location (MSM-DP-8), and at the approximate location of the former aircraft parts manufacturing area (MSM-DP-9). At all nine of the direct push locations, soil matrix samples will be collected from 2 feet, 5 feet, 10 feet, and 15 bgs. To establish a background concentration of AOCs, soil samples will also be collected as part of a separate SI Investigation from similar depths at an off-site groundwater sample location, GIL-CPT-6, which is located approximately 600 feet west of the northwestern portion of the site. All soil matrix samples will be analyzed for VOCs and metals.

4.1.2 Groundwater Sampling

A groundwater sample will be collected from two discrete depths at four of the ten proposed on-site direct push boring locations; MSM-DP-1, MSM-DP-6, MSM-DP-8, and MSM-DP-9; and will be collected from three discrete depths at all six of the proposed on-site and off-site CPT boring locations, MSM-CPT-1 through MSM-CPT-6. The collection of samples from multiple discrete depths within the shallow aquifers of the area (i.e., Gaspar and Exposition) will assist in the evaluation of potential impacts from AOCs on different water-bearing zones within these aquifers.

At the four on-site direct push locations, the samples will be collected from approximately 35 feet bgs (if sufficient groundwater is present) and 60 feet bgs. At the six on- and off-site CPT locations, the samples will be collected from approximately 60 feet bgs, 90 feet bgs, and 130 feet bgs. These depths were selected based upon a March 2013 CPT sounding, which was collected from a boring that was located approximately 600 feet west of the northwestern portion of the site, that indicated these depths corresponded to zones of coarser-grained materials and are likely to contain sufficient groundwater for sampling. The actual sample depths will be determined in the field based upon adjacent CPT lithological logs and/or areas where saturated subsurface soils conditions are encountered. Samples will be collected from multiple depths to evaluate potential impacts on different zones within the shallow aquifers of the area (i.e., Gaspar and Exposition).

The four on-site direct push locations were selected due to their proximity to areas that are known to have used and/or stored AOCs and include: at the approximate location of the former on-site clarifier (MSM-DP-1), at the approximate location of a former machine shop (MSM-DP-6), adjacent west of a former on-site UST location (MSM-DP-8), and at the approximate location of the former aircraft parts manufacturing area (MSM-DP-9). The six on- and off-site CPT locations were selected based upon their relative directions from the site with respect to the groundwater flow direction within the Exposition aquifer, which is estimated to be towards the southwest, as well as their ability to provide a more comprehensive profile of the subsurface characteristics within the more generalized region in the vicinity of the site. It is anticipated that two of the CPT borings (MSM-CPT-5 and MSM-CPT-6) will be located approximately upgradient of the on-site sample locations to determine background concentrations, two will be located approximately downgradient of the on-site sample locations (MSM-CPT-3 and MSM-CPT-4), and two will be located southeast of the site (MSM-CPT-1 and MSM-CPT-2) so as to provide a more comprehensive profile of the subsurface characteristics within the more generalized region in the vicinity of the site. It is anticipated that all of these locations will be located either on the site or on an adjacent public right-of-way. All groundwater samples will be analyzed for VOCs and metals.

4.2 Analytes of Concern

Based on the historic use of the site and the previous sampling events described in Section 2, specific AOCs at the site are:

- VOCs;
- Metals.

Subsequent to the SI sampling event, if any analytes in addition to the aforementioned are identified at concentrations significantly above background, they will be evaluated as AOCs for the purposes of the SI. Although chromium(VI) is considered to be an AOC for the site, it is not necessary to analyze soil or groundwater samples for chromium(VI) since EPA currently assumes, for conservative HRS scoring purposes, that all chromium in groundwater is of the chromium(VI) species.

Figure 5
Proposed Site Inspection
Sample Locations



- **Proposed Combined Direct Push Soil/Groundwater Grab Sample Location**
[Two discrete-depth Groundwater (~ 35 & 60 ft-bgs) and Soil Matrix (2, 5, 10, & 15 ft-bgs)]
(4 Locations = MSM-DP-1, MSM-DP-6, MSM-DP-8, & MSM-DP-9)
- **Proposed Direct Push Soil Sample Location [Soil Matrix only (2, 5, 10, & 15 ft-bgs)]**
(5 Locations = MSM-DP-2, MSM-DP-3 through MSM-DP-5, MSM-DP-7)
- **Proposed Groundwater Grab Sample Location (~ 60, 90, & 130 ft-bgs)**
(6 Locations = MSM-CPT-1 through MSM-CPT-6)

M. Stephens Manufacturing
4839 Patata Street
Cudahy, CA

All Soil and GW Samples to be analyzed for VOCs and Metals

Total Samples (not including QA): 26 groundwater samples
36 soil matrix samples

Note: Proposed Groundwater Sample Locations GIL-CPT-1 and GIL-CPT-6 are logistically associated with an adjacent site and is not included with the sample totals.

Draft Revision Date: **September 15th, 2015**. Disregard all undated and previous dated draft versions.

5.0 REQUEST FOR ANALYSES

Laboratory services for soil matrix and groundwater samples will be scheduled and arranged for by the EPA Region 9 RSCC for VOC and metals analyses. Samples will be analyzed through EPA's CLP. Sample containers, preservatives, holding times, and estimated number of field and Quality Control (QC) samples are summarized in Table 6 and Table 7.

As enumerated in Table 6, soil matrix field samples will be collected from four distinct depths at nine separate locations. In addition, four duplicate samples will be collected resulting in a total of 40 soil matrix samples. Additional sample volumes will be collected at two locations for use as laboratory QC samples. Each soil matrix sample will be analyzed for VOCs via EPA CLPAS SOM02.2 or equivalent and for metals via EPA CLPAS ISM02.2 (using ICP-MS) or equivalent.

As enumerated in Table 7, groundwater field samples will be collected from 10 distinct locations; which includes four on-site direct push locations, and six on- and off-site CPT locations. In addition, three duplicate samples will be collected resulting in a total of 29 aqueous samples. Up to six equipment blank and four field blank samples will be collected for QC purposes. An additional sample volume will be collected at two locations for use as a laboratory QC sample. Each groundwater sample will be analyzed for VOCs via EPA CLPAS SOM02.2 or equivalent and for metals via EPA CLPAS ISM02.2 (using ICP-MS) or equivalent.

To provide analytical quality control for the analytical program, the following measures will be utilized:

- All VOC and metals sample analysis will be conducted by a laboratory selected by the EPA Region 9 RSCC.
- Additional volume of sample will be collected for at least one sample per media per each analytical method, to be utilized for MS/MSD analysis.
- A CLP-type data package will be required from the laboratory for all resultant data.
- Holding times will be strictly observed for each analyte type and medium; holding times for each analysis are presented in Table 6 and Table 7.

Table 6: Request for Analytical Services, Matrix - Soil

| ANALYSES REQUESTED | | | | Organic | Inorganic |
|--|-----------------|-------------------------------|---------------------|---|------------------------------|
| ANALYTICAL METHOD | | | | CLPAS SOM02.2 | CLPAS ISM02.2 (using ICP-MS) |
| ANALYTE(S) | | | | VOCs | Metals |
| PRESERVATIVES | | | | Chill to 4±2°C | Chill to 4±2°C |
| ANALYTICAL HOLDING TIME(S) | | | | 48 hours | 180 days |
| CONTRACT HOLDING TIME(S) | | | | 48 hours | Analyze within 35 days |
| CONTAINER VOLUME | | | | 5 grams | 4 ounce |
| SAMPLE CONTAINER | | | | Plastic | Glass |
| NUMBER OF CONTAINERS | | | | 3 | 1 |
| SAMPLE VOLUME | | | | 15 grams | 4 ounce |
| Sample Number | Sample Location | Estimated Sample Depth (feet) | Special Designation | VOCs (Sample Volumes) | Metals (Sample Volumes) |
| MSM-SM-D01-0020 | MSM-DP-1 | 2 | | 1 | 1 |
| MSM-SM-D01-0050 | MSM-DP-1 | 5 | | 1 | 1 |
| MSM-SM-D01-0100 | MSM-DP-1 | 10 | | 1 | 1 |
| MSM-SM-D01-0150 | MSM-DP-1 | 15 | | 1 | 1 |
| MSM-SM-D02-0020 | MSM-DP-2 | 2 | | 1 | 1 |
| MSM-SM-D02-0050 | MSM-DP-2 | 5 | Lab QC | 2 | 2 |
| MSM-SM-D02-0100 | MSM-DP-2 | 10 | | 1 | 1 |
| MSM-SM-D02-0150 | MSM-DP-2 | 15 | | 1 | 1 |
| MSM-SM-D03-0020 | MSM-DP-3 | 2 | | 1 | 1 |
| MSM-SM-D03-0050 | MSM-DP-3 | 5 | | 1 | 1 |
| MSM-SM-D03-0100 | MSM-DP-3 | 10 | | 1 | 1 |
| MSM-SM-D03-0150 | MSM-DP-3 | 15 | | 1 | 1 |
| MSM-SM-D04-0020 | MSM-DP-4 | 2 | | 1 | 1 |
| MSM-SM-D04-0050 | MSM-DP-4 | 5 | | 1 | 1 |
| MSM-SM-D04-0100 | MSM-DP-4 | 10 | | 1 | 1 |
| MSM-SM-D04-0150 | MSM-DP-4 | 15 | | 1 | 1 |
| MSM-SM-D05-0020 | MSM-DP-5 | 2 | | 1 | 1 |
| MSM-SM-D05-0050 | MSM-DP-5 | 5 | Lab QC | 2 | 2 |
| MSM-SM-D05-0100 | MSM-DP-5 | 10 | | 1 | 1 |
| MSM-SM-D05-0150 | MSM-DP-5 | 15 | | 1 | 1 |
| MSM-SM-D06-0020 | MSM-DP-6 | 2 | | 1 | 1 |
| MSM-SM-D06-0050 | MSM-DP-6 | 5 | | 1 | 1 |
| MSM-SM-D06-0100 | MSM-DP-6 | 10 | | 1 | 1 |
| MSM-SM-D06-0150 | MSM-DP-6 | 15 | | 1 | 1 |
| MSM-SM-D07-0020 | MSM-DP-7 | 2 | | 1 | 1 |
| MSM-SM-D07-0050 | MSM-DP-7 | 5 | | 1 | 1 |
| MSM-SM-D07-0100 | MSM-DP-7 | 10 | | 1 | 1 |
| MSM-SM-D07-0150 | MSM-DP-7 | 15 | | 1 | 1 |
| MSM-SM-D08-0020 | MSM-DP-8 | 2 | | 1 | 1 |
| MSM-SM-D08-0050 | MSM-DP-8 | 5 | | 1 | 1 |
| MSM-SM-D08-0100 | MSM-DP-8 | 10 | | 1 | 1 |
| MSM-SM-D08-0150 | MSM-DP-8 | 15 | | 1 | 1 |
| MSM-SM-D09-0020 | MSM-DP-9 | 2 | | 1 | 1 |
| MSM-SM-D09-0050 | MSM-DP-9 | 5 | | 1 | 1 |
| MSM-SM-D09-0100 | MSM-DP-9 | 10 | | 1 | 1 |
| MSM-SM-D09-0150 | MSM-DP-9 | 15 | | 1 | 1 |
| GIL-SM-C06-0020 | GIL-CPT-6 | 2 | Background | <i>Soil background samples to be collected as part of a separate SI Investigation and are included in the sample totals for that project.</i> | |
| GIL-SM-C06-0050 | GIL-CPT-6 | 5 | Background | | |
| GIL-SM-C06-0100 | GIL-CPT-6 | 10 | Background | | |
| GIL-SM-C06-0150 | GIL-CPT-6 | 15 | Background | | |
| MSM-SM-D10-0100 | MSM-DP-1 | 5 | Duplicate | 1 | 1 |
| MSM-SM-D11-0050 | MSM-DP-3 | 5 | Duplicate | 1 | 1 |
| MSM-SM-D12-0050 | MSM-DP-7 | 5 | Duplicate | 1 | 1 |
| MSM-SM-D13-0050 | MSM-DP-9 | 5 | Duplicate | 1 | 1 |
| Total Number of Soil Matrix Field Samples | | | | 36 | 36 |
| Total Number of Duplicate Samples | | | | 4 | 4 |
| Total Number of Soil Matrix Samples | | | | 40 | 40 |
| Total Number of QC Volumes | | | | 2 | 2 |
| Total Number of Sample Volumes | | | | 42 | 42 |
| Total Number of Sample Containers | | | | 126 | 42 |
| Notes: Stated values for sample holding times, preservatives, volumes, and containers are preliminary and will be verified with the EPA RSCC prior to sampling. CLPAS = Contract Laboratory Program Analytical Services ICP-MS = Inductively coupled plasma mass spectrometry QC = Quality Control VOCs = Volatile Organic Compounds | | | | | |

Table 7: Request for Analytical Services, Matrix - Water

| ANALYSES REQUESTED | | | | Organic | Inorganic |
|--|-----------------|-------------------------------|---------------------|--|---|
| ANALYTICAL METHOD | | | | CLPAS SOM02.2 | CLPAS ISM02.2 (using ICP-MS) |
| ANALYTE(S) | | | | VOCs | Metals |
| PRESERVATIVES | | | | Add 1:1 HCL to pH <2; no pres. for low conc.; Cool to 4°C ±2°C | Field filter; Add HNO3 to pH <2; Chill to 4±2°C |
| ANALYTICAL HOLDING TIME(S) | | | | 14 days; 7 days for low conc. | 180 days |
| CONTRACT HOLDING TIME(S) | | | | Analyze within 10 days; 5 days for low conc. | Analyze within 35 days |
| CONTAINER VOLUME | | | | 40 mL | 500 mL |
| SAMPLE CONTAINER | | | | Glass VOA Vial | HDPE |
| NUMBER OF CONTAINERS | | | | 3 | 1 |
| SAMPLE VOLUME | | | | 120 mL | 500 mL |
| Sample Number | Sample Location | Estimated Sample Depth (feet) | Special Designation | VOCs (Sample Volumes) | Metals (Sample Volumes) |
| MSM-GW-D01-0350 | MSM-DP-1 | 35 | | 1 | 1 |
| MSM-GW-D01-0600 | MSM-DP-1 | 60 | | 1 | 1 |
| MSM-GW-D06-0350 | MSM-DP-6 | 35 | Lab QC | 2 | 2 |
| MSM-GW-D06-0600 | MSM-DP-6 | 60 | | 1 | 1 |
| MSM-GW-D08-0350 | MSM-DP-8 | 35 | | 1 | 1 |
| MSM-GW-D08-0600 | MSM-DP-8 | 60 | | 1 | 1 |
| MSM-GW-D09-0350 | MSM-DP-9 | 35 | Lab QC | 2 | 2 |
| MSM-GW-D09-0600 | MSM-DP-9 | 60 | | 1 | 1 |
| MSM-GW-C01-0600 | MSM-CPT-1 | 60 | | 1 | 1 |
| MSM-GW-C01-0900 | MSM-CPT-1 | 90 | | 1 | 1 |
| MSM-GW-C01-1300 | MSM-CPT-1 | 130 | | 1 | 1 |
| MSM-GW-C02-0600 | MSM-CPT-2 | 60 | | 1 | 1 |
| MSM-GW-C02-0900 | MSM-CPT-2 | 90 | | 1 | 1 |
| MSM-GW-C02-1300 | MSM-CPT-2 | 130 | | 1 | 1 |
| MSM-GW-C03-0600 | MSM-CPT-3 | 60 | | 1 | 1 |
| MSM-GW-C03-0900 | MSM-CPT-3 | 90 | | 1 | 1 |
| MSM-GW-C03-1300 | MSM-CPT-3 | 130 | | 1 | 1 |
| MSM-GW-C04-0600 | MSM-CPT-4 | 60 | | 1 | 1 |
| MSM-GW-C04-0900 | MSM-CPT-4 | 90 | | 1 | 1 |
| MSM-GW-C04-1300 | MSM-CPT-4 | 130 | | 1 | 1 |
| MSM-GW-C05-0600 | MSM-CPT-5 | 60 | Background | 1 | 1 |
| MSM-GW-C05-0900 | MSM-CPT-5 | 90 | Background | 1 | 1 |
| MSM-GW-C05-1300 | MSM-CPT-5 | 130 | Background | 1 | 1 |
| MSM-GW-C06-0600 | MSM-CPT-6 | 60 | Background | 1 | 1 |
| MSM-GW-C06-0900 | MSM-CPT-6 | 90 | Background | 1 | 1 |
| MSM-GW-C06-1300 | MSM-CPT-6 | 130 | Background | 1 | 1 |
| MSM-GW-C07-0600 | MSM-CPT-3 | 60 | Duplicate | 1 | 1 |
| MSM-GW-D10-0350 | MSM-DP-1 | 35 | Duplicate | 1 | 1 |
| MSM-GW-D11-0350 | MSM-DP-8 | 35 | Duplicate | 1 | 1 |
| MSM-FB01-[insertdate] | Field Blank | NA | Field Blank | 1 | 1 |
| MSM-FB02-[insertdate] | Field Blank | NA | Field Blank | 1 | 1 |
| MSM-FB03-[insertdate] | Field Blank | NA | Field Blank | 1 | 1 |
| MSM-FB04-[insertdate] | Field Blank | NA | Field Blank | 1 | 1 |
| MSM-EB01-[insertdate] | EQ Blank | NA | EQ Blank | 1 | 1 |
| MSM-EB02-[insertdate] | EQ Blank | NA | EQ Blank | 1 | 1 |
| MSM-EB03-[insertdate] | EQ Blank | NA | EQ Blank | 1 | 1 |
| MSM-EB04-[insertdate] | EQ Blank | NA | EQ Blank | 1 | 1 |
| MSM-EB05-[insertdate] | EQ Blank | NA | EQ Blank | 1 | 1 |
| MSM-EB06-[insertdate] | EQ Blank | NA | EQ Blank | 1 | 1 |
| Total Number of Aqueous Field Samples | | | | 26 | 26 |
| Total Number of Duplicate Samples | | | | 3 | 3 |
| Total Number of Aqueous Samples | | | | 29 | 29 |
| Total Number of QC Volumes | | | | 2 | 2 |
| Total Number of Field and EQ Blank Volumes | | | | 10 | 10 |
| Total Number of Sample Volumes | | | | 41 | 41 |
| Total Number of Sample Containers | | | | 123 | 41 |
| Notes: | | | | | |
| Stated values for sample holding times, preservatives, volumes, and containers are preliminary and will be verified with the EPA RSCC prior to sampling. | | | | | |
| CLPAS = Contract Laboratory Program Analytical Services | | | | HNO3 = nitric acid | |
| conc. = concentration | | | | ICP-MS = Inductively coupled plasma mass spectrometry | |
| EQ = equipment | | | | mL = milliliter | |
| HCL = hydrochloric acid | | | | QC = Quality Control | |
| HDPE = high-density polyethylene | | | | VOCs = Volatile Organic Compounds | |

6.0 METHODS AND PROCEDURES

6.1 Field Equipment

6.1.1 Sampling Equipment

The following equipment will be used to obtain environmental samples:

| Equipment | Matrix | Fabrication | Dedicated |
|---------------------|--------------|-------------|-----------|
| 40-micron Filter | Groundwater | Plastic | Yes |
| Tubing | Groundwater | Plastic | Yes |
| Trowel | Soil | Plastic | Yes |
| Hand Auger | Soil | Metal | No |
| Slide Hammer Sleeve | Soil | Brass | No |
| Sampler Sleeves | Soil | Acetate | Yes |
| Direct-Push Casing | All Matrices | Steel | No |
| Gloves | All Matrices | Nitrile | Yes |
| Ziploc®-style bags | All Matrices | Plastic | Yes |

A subcontractor will operate the direct push and sampling devices. Equipment maintenance will be the responsibility of the subcontracted companies using standard industry practices. All non-dedicated sampling equipment will be decontaminated between samples by washing with a low phosphate detergent solution, followed by two rinses with potable water.

6.1.2 Inspection/Acceptance Requirements for Supplies and Consumables

There are no project-specific inspection/acceptance criteria for supplies and consumables. It is standard operating procedure that: personnel will not use broken or defective materials, items will not be used past their expiration date, supplies and consumables will be checked against order and packing slips to verify the correct items were received, and the supplier will be notified of any missing or damaged items.

6.2 Sampling Procedures

6.2.1 Underground Utilities Clearance

All underground utilities will be located and identified by a geophysical survey team. If any subsurface utilities are suspected beneath proposed borings, the borings will be relocated in order to avoid the utilities. Underground Services Alert will be notified at least 72 hours before drilling commences. All boring locations will be advanced using a hand auger, air knife, or similar method to at least five feet bgs.

6.2.2 Soil Sampling

Soil matrix samples will be collected from a total of nine on-site locations (MSM-DP-1 through MSM-DP-9). The proposed soil sample locations are presented in Figure 5. At each location the asphalt or concrete surface, if applicable, will be cored until the underlying soils are encountered. The borings will then be advanced by hand-auger to a total depth of 5 feet bgs. The soil lithology will be logged in the field and soil samples will be collected from all nine borings at 2 feet bgs. The borings will then be further advanced using direct push technology in accordance with EPA ERT SOP #2050 (Appendix E) to a sufficient depth for all proposed soil matrix samples to be collected. During the direct push advancement, soil lithology will be logged to at least the depth of the deepest soil matrix sample. At each location additional soil samples will be collected from approximately 5 feet bgs, 10 feet bgs, and 15 feet bgs. At four locations (MSM-DP-1, MSM-DP-6, MSM-DP-8, and MSM-DP-9) the borings will be further advanced to depths sufficient to collect groundwater samples as described in Section 6.2.3. It will be determined in the field based upon the actual site conditions and sampling schedule if soil lithology will be logged to the total depth of the direct push borings. The borings will be backfilled in a manner consistent with the requirements of the Los Angeles County Department of Health, which is generally a combination of granular bentonite, hydrated bentonite chips, and grout.

Subsurface soil matrix samples obtained from the upper 5 feet of borings will be collected directly using a slide hammer and brass sleeve, which will be dedicated or appropriately decontaminated between each boring. Samples collected at 5 feet bgs and below will be collected directly from the direct push acetate liners. The sample portion to be used for VOC analysis will be collected first by use of a 5-gram En Core®-type sampling device. The 5-gram containers will be immediately sealed, labeled, and chilled to 4°C. Subsequent to the collection of the VOC portion of the sample, the metals portion of the sample will be collected and placed in to a Ziploc®-style bag. The samples will be homogenized in the bag and then transferred with a dedicated plastic trowel from the bag to 4-ounce wide-mouth glass jars. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. Sample containers will be closed as soon as they are filled, immediately chilled to 4°C, and processed for shipment to the laboratory.

All soil matrix samples will be analyzed for VOCs and metals.

6.2.3 Groundwater Sampling

Groundwater samples will be collected from four on-site proposed direct push boring locations (MSM-DP-1, MSM-DP-6, MSM-DP-8, and MSM-DP-9), two on-site proposed CPT locations (MSM-CPT-5 and MSM-CPT-6), and four off-site proposed CPT locations (MSM-CPT-1 through MSM-CPT-4). At each of the four direct push locations, the borings will be advanced to groundwater as described in Section 6.2.3. Two discrete-depth groundwater samples will be collected from each location at estimated depths of 35 ft-bgs and 60 ft-bgs; however, the actual sample depths will be determined in the field based upon the depths at which sufficient groundwater is encountered and/or adjacent CPT logging information.

At all six of the on- and off-site CPT locations (MSM-CPT-1 through MSM-CPT-6) the borings will be initially advanced to a total depth of approximately 150 feet bgs using the CPT drilling rig. As the borehole is advanced, the CPT drill rig will collect subsurface lithological data (i.e., relative density, static and dynamic pore pressure, hydraulic conductivity) that will be immediately provided to the WESTON field personnel. Based upon this data, WESTON personnel will determine the specific depths to collect the discrete-depth groundwater samples, which are proposed to be at approximately 60 ft-bgs, 90 ft-bgs, and 130 ft-bgs. The CPT drill rig will then advance a second boring to collect each of the groundwater grab samples.

Once the proper depth has been attained at all direct push and CPT groundwater sample locations, an in-situ groundwater sample will be collected using a Hydropunch™ water sampling device, or equivalent. The Hydropunch™ is inserted into undisturbed soils at the base of the borehole. The outer portion of the Hydropunch™ is then retracted to expose a PVC screen in the water-bearing zone. A mini-bailer is lowered into the screen for collection of an in-situ groundwater sample. Because groundwater samples collected with a Hydropunch™ are representative of in-situ groundwater conditions, samples may be collected immediately without purging or measurement of water quality parameters. The Hydropunch™ is a sealed unit so water from the upper sample location will not migrate to lower sample locations.

Groundwater samples to be analyzed for VOCs will be collected by pouring the sample directly from the bailer into 40-milliliter (mL) vials preserved in the field with hydrochloric acid (HCl), to a final pH of less than 2. The vials will be immediately capped and inverted to check for air bubbles to ensure zero head space. If a bubble appears, the vial will be discarded and a new sample will be collected.

Groundwater samples to be analyzed for metals will be collected by filtering the sample directly from the bailer into a 500-mL High-Density Polyethylene (HDPE) container, which will be preserved in the field with nitric acid (HNO₃) to a final pH of less than 2. In the event that it is not feasible to filter the sample directly from the original sampling device, the sample will be transferred to a dedicated HDPE container and then filtered into the final sample container. The filtering will be conducted either via a 40-micron filter that will connect directly to the bailer or by use of a peristaltic pump to pump the sample through a 40-micron in-line filter.

Subsequent to the collection of each sample in the appropriate container, the sample will be immediately chilled on ice and processed for shipment to the assigned laboratory. When

transferring samples, care will be taken not to touch the bailer to the sample container. For duplicate samples, bottles with the two different sample designations will be filled in an alternating sequence. All groundwater samples will be analyzed for VOCs and metals.

6.3 Decontamination Procedures

The decontamination procedures that will be followed are in accordance with approved procedures. Decontamination of sampling equipment must be conducted consistently to assure the quality of samples collected. All non-dedicated equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of non-dedicated equipment. All non-dedicated sampling devices will be steam-cleaned or decontaminated according to EPA Region 9 recommended procedures.

The following, to be carried out in sequence, is an EPA Region 9 recommended procedure for the decontamination of sampling equipment:

- Non-phosphate detergent and tap-water wash, using a brush if necessary
- Tap-water rinse
- Deionized/distilled water rinse (twice)

Equipment will be decontaminated in a pre-designated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

7.0 DISPOSAL OF INVESTIGATION - DERIVED WASTE

In the process of collecting environmental samples at this site, several different types of potentially contaminated investigation-derived wastes (IDW) will be generated, including the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Decontamination fluids
- Excess soil, including cuttings from soil borings.

The EPA's National Contingency Plan requires that management of IDW generated during site investigations comply with all relevant or appropriate requirements to the extent practicable. This sampling plan will follow the *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991)* which provides the guidance for management of IDW during site investigations. Listed below are the procedures that will be followed for handling IDW. The procedures are flexible enough to allow the site investigation team to use its professional judgment on the proper method for the disposal of each type of IDW generated at each sampling location.

- Used PPE and disposable sampling equipment will be double-bagged in plastic trash bags and disposed of in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE or dedicated equipment that is to be disposed of that can still be reused will be rendered inoperable before disposal.
- Decontamination fluids that will be generated in the sampling event will consist of deionized water, residual contaminants, and water with non-phosphate detergent. Decontamination fluids will be drummed and staged on site pending laboratory analysis for VOCs and metals. Subsequent to the analysis, the fluids will be disposed in an appropriate manner.
- Soil cuttings generated during the subsurface sampling will be drummed and staged on site pending laboratory analysis for VOCs and metals. Subsequent to the analysis, the cuttings will be disposed in an appropriate manner.

8.0 SAMPLE IDENTIFICATION, DOCUMENTATION AND SHIPMENT

8.1 Field Notes

8.1.1 Field Logbooks

Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be completed and accurate enough to permit reconstruction of field activities. The logbook is bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions. At a minimum, the following information will be recorded, if applicable, during the collection of each sample.

- Sampler's name(s)
- Date and time of sample collection
- Type of sample (e.g., groundwater)
- Type of sampling equipment used
- Field instrument readings and calibration readings for any equipment used, and
- equipment model(s) and serial number(s)
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Sample preservation
- Lot numbers of the sample containers, sample identification numbers and any
- explanatory codes, and chain-of-custody form numbers
- Shipping arrangements (overnight air bill number)
- Name(s) of recipient laboratory(ies)

In addition to sampling information, the following specifics may also be recorded in the field logbook for each day of sampling:

- Team members and their responsibilities
- Time of arrival on site and time of site departure
- Other personnel on site
- Summary of any meetings or discussions with any potentially responsible parties, or representatives of any federal, state, or other regulatory agency
- Deviations from sampling plans or site safety plan procedures
- Changes in personnel and responsibilities, as well as reasons for the change
- Levels of safety protection
- Record of photographs

8.1.2 Photographs

Photographs will be taken at representative sampling locations and at other areas of interest on site. They will verify information entered in the field logbook. When a photograph is taken, the

following information will be written on the logbook or will be recorded in the field photography log:

- Date, location
- Description of the subject photographed
- Name of person taking the photograph

8.2 Sample Nomenclature

A unique, identifiable name will be assigned to each sample. The prefix “MSM” will be used to identify the M. Stephens site. The qualifiers “SM” (soil matrix) and “GW” (ground water) will be used to identify the sample medium. The boring location and sample depth (to the tenth of a foot) will be identified and follow the medium qualifier. The boring location will be qualified with either a “D” to indicate a direct push location or a “C” to identify a CPT location. The identified depth for groundwater samples will be the center of the sample screen. A unique number will be assigned to each sample location. For example, if a soil matrix sample is collected from 5.5 feet bgs at MSM-DP-3, the sample number will be “MSM-SM-D03-0055.” If a groundwater sample is collected at MSM-CPT-3 with the screen set from 62 to 66 feet bgs, the sample number will be “MSM-GW-C03-0640.” Duplicate samples will be assigned fictitious names. For equipment blanks and field blanks, the qualifiers “EB” and “FB” will be used respectively in place of the location/depth identification. The EPA RSCC may assign additional sample numbers. See Section 4, Table 6, and Table 7 for specific nomenclature and location assignments.

8.3 Container, Preservation, and Holding Time Requirements

All sample containers used will have been delivered to WESTON in a pre-cleaned condition. Container, preservation, and holding time requirements are summarized in in Table 6 and Table 7.

8.4 Sample Labeling, Packaging and Shipping

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Soil- and water-matrix sample labels will be created using the SCRIBE data management system. Soil- and water-matrix sample labels will be affixed to the sample containers and secured with clear tape. Samples will have preassigned, identifiable and unique numbers in accordance with Section 8.2. The soil sample labels will contain the following information where appropriate:

- Sample number
- Sample location
- Date and time of collection
- Site name
- Analytical parameter and method of preservation
- CLP Case Number (if applicable)

Sample coolers will be retained in the custody of site personnel at all times or secured so as to deny access to anyone else. The procedures for shipping samples are as follows:

- The bottom of the cooler will be lined with bubble wrap to prevent breakage during shipment.
- Screw caps will be checked for tightness.
- Containers will have custody seals affixed so as to prevent opening of the container without breaking the seal.
- All glass sample containers will be wrapped in bubble wrap.
- All containers will be sealed in Ziploc®-style bags.

All samples will be placed in coolers with the appropriate chain-of-custody forms. The SCRIBE data management system will be used to create all chain-of-custody forms. All forms will be enclosed in plastic bags and affixed to the underside of the cooler lid. Empty space in the cooler will be filled with bubble wrap or styrofoam peanuts to prevent movement and breakage during shipment. Each ice chest will be securely taped shut with strapping tape, and custody seals will be affixed to the front, right, and back of each cooler.

Samples will be shipped for immediate delivery to the contracted laboratory. The EPA Region 9 Regional Sample Control Coordinator ((510) 412-2389) will be notified daily of the sample shipment schedule and will be provided with the following information:

- Sampling contractor's name
- The name of the site
- Case number
- Shipment date and expected delivery date
- Total number of samples by matrix, and relative level of contamination (i.e., low, medium, or high)
- Carrier, air bill number(s), and method of shipment (e.g., priority)
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be sent, if this is the last shipment]

8.5 Chain of Custody Forms and QA/QC Summary Forms

A chain of custody form will be maintained for all samples to be submitted for analysis, from the time the sample is collected until its final deposition. All chain of custody forms for the samples will be maintained by WESTON.

Every transfer of custody must be noted and signed for; a copy of this record is kept by each individual who has signed. Corrections on sample paperwork will be made by drawing a single line through the mistake and initialing and dating the change. The correct information will be entered above, below, or after the mistake. When samples are not under the direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. The chain of custody must include the following:

- Sample identification numbers
- Site name
- Sample date
- Number and volume of sample containers
- Required analyses
- Signature and name of samplers
- Signature(s) of any individual(s) with control over samples
- Airbill number
- Note(s) indicating special holding times and/or detection limits

Traffic reports will be used to document sample collection and shipment to the laboratory for analysis. The SCRIBE data management system will be used to generate all traffic reports and chains of custody. One copy will be completed and sent with the samples for each laboratory and each shipment. If multiple coolers are sent to a single laboratory on a single day, only one form will be completed. If all sample information cannot be entered in one form, then multiple forms will be used. One copy of the form will be sent to the EPA RSCC, another copy will be sent to Contract Laboratory Analytical Services Support, and one copy will accompany the samples to the laboratory. A photocopy of the original will be made for WESTON's master file. The document titled "*Contract Laboratory Program Guidance for Field Samplers*," EPA Superfund document 540-R-07-06, will be taken to the field as a reference. This document is included in Appendix F.

A QA/QC summary form will be completed for each laboratory and each matrix of the sampling event. The sample number for all blanks, reference samples, laboratory QC samples (MS/MSDs) and duplicates will be documented on this form. This form is not sent to the laboratory. The original form will be sent to the EPA; a photocopy of the original will be made for WESTON's master file.

9.0 QUALITY ASSURANCE AND CONTROL (QA/QC)

9.1 Field Quality Control Samples

The QA/QC samples described in the following subsections, which are also listed in Table 6 and 7, will be collected during this investigation.

9.1.1 Assessment of Field Contamination (Blanks)

9.1.1.1 Equipment Blanks

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring either store-bought distilled water or laboratory-certified ‘clean’ water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per day for each piece of sampling equipment that is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. Equipment blanks will be analyzed for VOCs and metals (see Table 7).

The equipment blanks will be preserved, packaged, and sealed in the manner described for the groundwater samples in Section 6.2. A separate sample number will be assigned to each sample as described in Section 8.2.

If any compound is detected in field blanks or equipment blanks, then sample data will be considered acceptable without qualification only if the results are above five times the amount detected in the blank(s) for each respective analyte. If the analyte detected in the blank is a common laboratory contaminate, then the sample results for those analytes would be qualified unless the results are above ten times the amount detected in the blank(s). Sample results that are below five times (ten times for common laboratory contaminants) the amount detected in the blanks, additional evaluation will be required during data validation.

9.1.1.2 Field Blanks

A field blank will be collected from each container of distilled water used to collect the equipment rinsate blanks described in Section 9.1.1.1. In the event that only laboratory-certified ‘clean’ water is used in the collection of equipment blanks, no field blanks will be collected. The field blank sample will consist of filling the appropriate sample container directly from the store-bought distilled water container. The field blanks will be preserved, packaged, and sealed in the manner described for the groundwater samples in Section 6.2. A separate sample number will be assigned to each sample as described in Section 8.2. Field blanks will be analyzed for VOCs and metals. If any compound is detected in the field blanks, this information will be considered when evaluating equipment blank samples as described in Section 9.1.1.1.

9.1.1.3 Temperature Blanks

For each cooler that is shipped or transported to an analytical laboratory, a 40-mL vial of store-bought distilled water will be included that is marked “temperature blank.” This blank will be used by the sample custodian to check the temperature of samples upon receipt.

9.1.2 Assessment of Sample Variability (Field Duplicate or Co-located Samples)

Duplicate soil matrix and groundwater samples will be collected at the sample locations indicated in Table 6 and Table 7. Locations for duplicate samples were chosen based on the potential of the sample containing AOCs. At a minimum, one sample per 10 samples, per matrix, will be designated as a duplicate sample. The acceptance criteria for duplicate samples are presented in Section 3.5.3.

When collecting duplicate water samples, bottles with the two different sample identification numbers will be alternated in the filling sequence.

When collecting duplicate soil matrix samples to be analyzed for metals, the samples will be homogenized in a sample-dedicated Ziploc®-style bag. Homogenized materials will then be transferred to the appropriate sample container. When collecting duplicate soil matrix samples to be analyzed for VOCs, the samples will not be homogenized to reduce the potential for volatilization. These equivalent (co-located) samples will be collected from the sample sleeve, alternating with collection of the original samples.

Duplicate samples will be preserved, packaged, and sealed in the same manner described for the groundwater samples in Section 6.2. A separate sample number will be assigned to each duplicate as described in Section 8.2 and presented in Table 6 and Table 7. All duplicate samples will be submitted blind to the laboratory.

9.2 Background Samples

Background groundwater samples will be collected in the estimated upgradient direction of the site to differentiate between on-site and off-site contributions to contamination. Background soil matrix samples will be collected from a location deemed to have a lower potential for elevated concentrations of AOCs. Background samples will be submitted blind to the laboratory and analyzed by the methods indicated in Table 6 and Table 7.

9.3 Laboratory Quality Control (QC) Samples

A laboratory QC sample is not an extra sample; rather, it is a sample that requires additional QC analyses.

For water samples, double volumes of sample will be provided to the laboratory for its use for QC purposes. Two sets of water sample containers will be filled and all containers labeled with a single sample number.

For soil matrix samples, double volumes of sample will be provided to the laboratory for its use for QC purposes. When collecting double-volume QC soil matrix samples to be analyzed for metals, the samples will be homogenized in a sample-dedicated Ziploc®-style bag. Homogenized materials will then be transferred to the appropriate sample container. When collecting double-volume QC soil matrix samples to be analyzed for VOCs, the samples will not be homogenized to reduce the potential for volatilization. These equivalent (co-located) samples will be collected from the sample sleeve, alternating with collection of the original samples.

For this sampling event, the samples collected at the locations indicated in Table 6 and Table 7 will be the designated laboratory QC samples. These locations were chosen because they are suspected to contain detectable levels of AOCs. The sample labels and chain-of-custody records for these samples will identify them as a laboratory QC samples. At a minimum, one sample per 20 samples, per matrix, will be designated as a laboratory QC sample.

9.4 Analytical and Data Package Requirements

It is required that all samples be analyzed in accordance with the methods listed in Table 6 and Table 7. The laboratory is required to supply documentation to demonstrate that their data meet the requirements specified in the contract.

The data validation package shall include all original documentation generated in support of this project. In addition, the laboratory will provide original documentation to support that all requirements of the methods have been met. This includes, but is not limited to, sample tags, custody records, shipping information, sample preparation/extraction records, and instrument printouts such as mass spectra. Copies of information and documentation required in this document are acceptable. CLP methods will follow the contract required data package requirement.]

9.5 Data Validation

Validation of analytical data generated by the CLP and contract laboratories for this investigation will be contracted by the EPA in accordance with the *EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 540-R-99\008, 10/99)*, the *EPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review (EPA540-R-00-006, 06/01)*, and/or the *EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 540-R-04\001, 10/04)*. Tier 3 validation for 100% of the data will be required.

To meet requirements for categorization as definitive data, the following criteria will be evaluated:

- Holding times
- Sampling design approach
- Blank contamination
- Initial and continuing calibration
- Detection limits
- Analyte identification and quantitation

- Matrix spike recoveries
- Performance evaluation samples when specified
- Analytical and total error determination
- Laboratory Control Samples.

Upon completion of validation, data will be classified as one of the following: acceptable for use without qualifications, acceptable for use with qualifications, or unacceptable for use.

9.6 Field Variances

As conditions in the field may vary, it may become necessary to implement minor modifications to this plan. When appropriate, the EPA will be notified of the modifications and a verbal approval obtained before implementing the modifications. Modifications to the original plan will be documented in the final report.

9.7 Assessment of Project Activities

9.7.1 WESTON Assessment Activities

The following assessment activities will be performed by WESTON:

- All project deliverables (SAP, Data Summaries, Data Validation Reports, Site Inspection Report) will be peer-reviewed prior to release to the EPA. In time-critical situations, the peer review may be concurrent with the release of a draft document. Errors discovered in the peer review process will be reported by the reviewer to the originator of the document, who will be responsible for corrective action.
- The WESTON QA Officer will review project documentation (logbooks, chain of custody forms, etc.) to ensure the SAP was followed and that sampling activities were adequately documented. The WESTON QA Officer will document deficiencies and the WESTON Project Manager will be responsible for corrective actions. The WESTON QA Officer is also responsible for review and assessment of the data for data quality issues for the project.
- The WESTON Project Manager is responsible for the review of data, and ensuring that sampling design approach and total error determination meet the DQOs for this project.

9.7.2 EPA Assessment Activities

EPA assessment activities, which can include surveillance, management system reviews, readiness reviews, technical system audits, performance evaluation, and audits and assessments of data quality, have not been formally identified to WESTON by the EPA at the time of completion of the SAP.

9.7.3 Project Status Reports to Management

It is standard procedure for the WESTON PM to report to the EPA SAM any issues, as they occur, that arise during the course of the project that could affect data quality, data use objectives, the project objectives, or project schedules.

9.7.4 Reconciliation of Data with DQOs

Assessment of data quality is an ongoing activity throughout all phases of a project. The following outlines the methods to be used by WESTON for evaluating the results obtained from the project.

- Review of the DQO outputs and the sampling design will be conducted by the WESTON QA Officer and the EPA prior to sampling activities. The reviewer will submit comments to the WESTON PM for action, comment, or clarification. This process will be iterative.
- A preliminary data review will be conducted by WESTON. The purpose of this review is to look for problems or anomalies in the implementation of the sample collection and analysis procedures and to examine QC data for information to verify assumptions underlying the DQOs and the SAP. Anomalies may include changes in the MRLs as a result of dilution, sampling, and/or matrix factors across the sample suite; such anomalies will be reported in writing to the SAM when they are confirmed.
- Data review will also include a comparison of analytical results, MRLs, and background concentrations in an effort to determine whether each result can be identified as “significantly above,” or “significantly below” background, as defined in Section 3.3.

10.0 REFERENCES

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APPENDIX A:
DATA QUALITY OBJECTIVE WORKSHEET

DATA QUALITY OBJECTIVES
M. Stephens Manufacturing, Inc. Site
MEDIA OF CONCERN:

| STEP 1. STATE THE PROBLEM | |
|---|--|
| <p>The site has been used for metal fabrication, electric parts manufacturing, tool manufacturing, and die-cast electrical parts manufacturing from approximately the late 1940s through 2003. Specific on-site activities, hazardous substances, and hazardous substance management practices are not known. Tetrachloroethylene (PCE) -containing waste was generated at the site during at least the late 1980s and in 1999. Process wastewaters generated during on-site activities were historically treated using a sub-grade clarifier system until approximately 2003; it is not known when the clarifier system was installed. A subsurface investigation conducted at the site in 2005 identified detectable concentrations of PCE in shallow soil beneath the site. The site is situated upgradient with respect to the regional groundwater flow from several municipal supply wells that have been identified with elevated concentrations of volatile organic compounds (VOCs). The site is located approximately 0.17 mile north-northwest of the City of South Gate's Well 7, which was removed from service in approximately 2002 and destroyed in 2011 due primarily to elevated concentrations of contaminants, including trichloroethylene (TCE), arsenic, and chromium. The site is also located approximately 0.28 mile west-southwest of the Golden State Water Company (GSWC) - Bell/Bell Gardens system's Hoffman Well 02, which was removed from service in approximately late 2000 and destroyed in approximately October 2007 due primarily to elevated concentrations of chromium.</p> | |
| STEP 2. IDENTIFY THE DECISION | |
| <p>Subsurface soil samples will be collected from approximately 0 to 15 feet below ground surface at locations on and off site. Groundwater samples will be collected from multiple aquifer zones ranging from approximately 35 to 130 feet below ground surface at locations on and off site.</p> | |
| <p>IDENTIFY THE ALTERNATIVE ACTIONS THAT MAY BE TAKEN BASED ON THE DECISIONS.</p> | <ul style="list-style-type: none"> • If AOCs are identified in soils at the site, then a release to soil has been confirmed. The soils may be included as a source of contamination for HRS purposes. • If no AOCs are identified in site soils, then no release to soils will have been documented. • If AOCs are also identified in groundwater at the site, then an observed release to groundwater will be documented and integrated into the site's HRS score. • If AOCs are not identified in groundwater at the site, then no release to groundwater will have been documented. |
| STEP 3. IDENTIFY INPUTS TO THE DECISION | |
| <p>IDENTIFY THE INFORMATIONAL INPUTS NEEDED TO RESOLVE A DECISION.</p> | <ul style="list-style-type: none"> • Definitive laboratory analysis of soil matrix and groundwater samples for AOCs |
| <p>IDENTIFY THE SOURCES FOR EACH INFORMATIONAL INPUT AND LIST THE INPUTS THAT ARE OBTAINED THROUGH ENVIRONMENTAL MEASUREMENTS.</p> | <ul style="list-style-type: none"> • Core samples collected at depths ranging from 0 to 15 feet below ground surface. • Groundwater samples collected at depths ranging from 35 to 130 feet below ground surface. • Analytical results from soil and groundwater analyses by ISM02.2 and SOM02.2. |
| <p>BASIS FOR THE CONTAMINANT SPECIFIC ACTION LEVELS.</p> | <p>The action levels for groundwater are, as dictated by the HRS, concentrations elevated above the background levels from a comparable background location located outside of the area potentially influenced by the site. For most Analytes of Concern (AOCs), significantly above background is defined as three times the background concentration. Therefore, comparable background samples will be collected from soil and groundwater to establish action levels.</p> |

DATA QUALITY OBJECTIVES
M. Stephens Manufacturing, Inc. Site
MEDIA OF CONCERN:

| | |
|---|--|
| IDENTIFY POTENTIAL SAMPLING TECHNIQUES AND APPROPRIATE ANALYTICAL METHODS. | <ul style="list-style-type: none"> ISM02.2 for metals SOM02.2 for VOCs |
| STEP 4. DEFINE THE BOUNDARIES OF THE STUDY | |
| DEFINE THE DOMAIN OR GEOGRAPHIC AREA WITHIN WHICH ALL DECISIONS MUST APPLY. | Site soils and background soils, upgradient groundwater and downgradient groundwater. |
| SPECIFY THE CHARACTERISTICS THAT DEFINE THE POPULATION OF INTEREST. | Soil and groundwater concentrations of VOCs and metals. |
| DEFINE THE SCALE OF DECISION MAKING. | Results of soil samples will be used to determine whether contaminants are present in the subsurface soil and results of groundwater samples will be used to determine if contaminants have migrated to groundwater from an on-site source. |
| DETERMINE THE TIME FRAME TO WHICH THE DATA APPLY. | The data will represent the conditions of site contaminants impacting groundwater in the foreseeable future. For the HRS objectives, all data will be compared to background samples collected as part of the same sampling event to minimize any temporal effects on the data. Data will be useable for comparison to health based action levels based on risk from long term exposure. |
| DETERMINE WHEN TO COLLECT DATA. | Samples will be collected during the Site Inspection phase of investigation and in temporal concurrence with Site Inspection activities at five adjacent sites. |
| IDENTIFY PRACTICAL CONSTRAINTS ON DATA COLLECTION. | Site access will be required from EPA. |
| STEP 5. DEVELOP A DECISION RULE | |
| SPECIFY THE PARAMETER THAT CHARACTERIZES THE POPULATION OF INTEREST. | Each analytical result, not a statistical parameter such as mean concentration, will be evaluated against the corresponding action levels. |

DATA QUALITY OBJECTIVES
M. Stephens Manufacturing, Inc. Site
MEDIA OF CONCERN:

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| <p>SPECIFY THE ACTION LEVEL FOR THE DECISION.</p> | <p>If source materials (site soils) are found to be contaminated by VOCs and/or metals; then the presence of hazardous substances in the source will be documented and integrated into the site's HRS score.</p> <p>If groundwater beneath the site is also found to be contaminated by VOCs and/or metals; then a release of hazardous substances from the site to groundwater will be documented and integrated into the site's HRS score.</p> |
| <p>STEP 6. SPECIFY LIMITS ON DECISION ERRORS</p> | |
| <p>DEVELOP A DECISION RULE.</p> | <p>If AOCs are identified in soils at the site, then a release to soil has been confirmed. The soils may be included as a source of contamination for HRS purposes.</p> <p>If AOCs are also identified in groundwater at the site, then an observed release to groundwater will be documented and integrated into the site's HRS score.</p> |
| <p>DETERMINE THE POSSIBLE RANGE OF THE PARAMETER OF INTEREST.</p> | <p>Use of biased sampling points precludes statistical determination of limits on decision errors. Measurement error, rather than sampling error, is deemed to be the primary factor affecting any decision error. Validated, definitive data will be required to limit measurement error. Sampling error will be limited to the extent practicable by following approved EPA methods and applicable SOPs. Sampling error and tolerable limits cannot be quantified.</p> |
| <p>DEFINE BOTH TYPES OF DECISION ERRORS AND IDENTIFY THE POTENTIAL CONSEQUENCES OF EACH.</p> | <p><u>Type I Error</u>: Deciding that the specified area represented by the soil sample does not exceed the specified assessment level when, in truth, the waste soil concentration of the contaminant exceeds its specified assessment level. The consequence of this decision error is that may migrate to groundwater, possibly endangering human health and the environment. This decision error is more severe.</p> <p><u>Type II Error</u>: Deciding that the specified area represented by the soil sample does exceed the specified assessment level when, in truth, it does not. The consequences of this decision error are that engineering controls may be installed and unnecessary costs will be incurred.</p> |

DATA QUALITY OBJECTIVES
M. Stephens Manufacturing, Inc. Site
MEDIA OF CONCERN:

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|--|---|
| ESTABLISH THE TRUE STATE OF NATURE FOR EACH DECISION RULE. | <p>The true state of nature when the soil is decided to be below the specified assessment levels when in fact, it is not below the specified assessment levels, is that the groundwater may be threatened by overlying soils.</p> <p>The true state of nature when the soil is decided to be above the specified assessment levels when in fact, it is not above the specified assessment levels, is that groundwater is not threatened by overlying soils.</p> |
| DEFINE THE TRUE STATE OF NATURE FOR THE MORE SEVERE DECISION ERROR AS THE BASELINE CONDITION OR THE NULL HYPOTHESIS (H_0) AND DEFINE THE TRUE STATE FOR THE LESS SEVERE DECISION ERROR AS THE ALTERNATIVE HYPOTHESIS (H_a). | <p>H_0: The soil represented by the sample is above the specified action level.</p> <p>H_a: The soil represented by the sample is below the specified action level.</p> |
| ASSIGN THE TERMS "FALSE POSITIVE" AND "FALSE NEGATIVE" TO THE PROPER DECISION ERRORS. | <ul style="list-style-type: none"> False Positive Error = Type I False Negative Error = Type II |
| ASSIGN PROBABILITY VALUES TO POINTS ABOVE AND BELOW THE ACTION LEVEL THAT REFLECT THE ACCEPTABLE PROBABILITY FOR THE OCCURRENCES OF DECISION ERRORS. | <p>EXAMPLE: Results of each sample will be considered to be representative of the strata from which it was collected. No statistical analysis will be conducted.</p> |
| STEP 7. OPTIMIZE THE DESIGN | |
| REVIEW THE DQOs. | <p>The goal of this sampling event is to document the presence of hazardous substances in the source. Site soils will be sampled to satisfy this goal. In addition, groundwater will be sampled to document a release of hazardous substances to groundwater beneath the site.</p> |
| <p>DEVELOP GENERAL SAMPLING AND ANALYSIS DESIGN.</p> <p>Soil matrix samples will generally be collected at 2', 5', 10', and 15' bgs., to evaluate the presence of AOCs in the subsurface soil. Groundwater samples will be collected from various depths ranging from approximately 35' to 130' bgs. All soil and groundwater samples will be collected using direct push methods, either with a truck-mounted Geoprobe unit or a Cone Penetration Testing drilling rig.</p> | |

APPENDIX B:
SITE SPECIFIC HEALTH AND SAFETY PLAN

APPENDIX C:
INSTRUCTIONS FOR
SAMPLE SHIPPING
AND
DOCUMENTATION

**INSTRUCTIONS FOR
SAMPLE SHIPPING
AND DOCUMENTATION**

November 1997

Quality Assurance Management Section
U. S. EPA Region 9
San Francisco, CA

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1.0 **GENERAL**

- 1.1 When all paperwork has been completed by the sampler and samples are ready to be shipped, place the laboratories' copies in a plastic bag and tape it to the inside of the lid of the cooler(s). For CLP Analytical Services, Contract Laboratory Analytical Services Support's (CLASS) copies must be submitted within 5 days of sampling. The Region's copies may be submitted at that time or at the end of the sampling event. If the sampling event covers an extended length of time, the Region's copies must be submitted weekly. (Note: The RSCC coordinator will not forward CLASS's copies. They will be returned to the sampler.)

QAMS address:

U.S. EPA Region 9
Quality Assurance Program (PMD-3)
75 Hawthorne Street
San Francisco, CA 94105
Attn.: RSCC Coordinator

CLASS address:

Contract Laboratory Analytical Services Support
DynCorp
2000 Edmund Halley Dr.
Reston, VA 20191-3436
Attn.: Region 9 Coordinator

- 1.2 For analyses performed by the Regional Laboratory, DO NOT send any copies of the paperwork to the Contract Laboratory Analytical Services Support (CLASS).

1.3 DISTRIBUTION OF COPIES

1.3.1 CLP ANALYTICAL SERVICES

1.3.1.1 ORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY FORM

- a. Blue (original) copy to QAMS, Region 9
- b. Pink (second) copy to CLASS
- c. White (third) and Yellow (fourth) copies accompany samples to laboratory
- d. Photocopy for sampler's files

1.3.1.2 INORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY FORM

- a. Green (original) copy to QAMS, Region 9
- b. Pink (second) copy to CLASS
- c. White (third) and Yellow (fourth) copies accompany samples to laboratory
- d. Photocopy for sampler's files

1.3.2 REGIONAL ANALYTICAL PROGRAM (RAP):

1.3.2.1 RAP CHAIN-OF-CUSTODY FORM

- a. White (original) copy to laboratory with samples

- b. Pink copy to QAMS, Region 9
- c. Photocopy for sampler's file

1.3.3 FIELD QA/QC SUMMARY FORM

- a. Original to QAMS, Region 9
- b. Photocopy for sampler's files

2.0 **SAMPLE SHIPMENTS**

2.1 Calling in shipments to the RSCC coordinator

- 2.1.1 Call the EPA Regional Sample Control Center (RSCC) coordinator on a daily basis, even if no shipments were made. The RSCC coordinator may be reached at (415) 744-1498.
- 2.1.2 Try to stick to the sampling schedule. If this is not possible, let the RSCC coordinator know immediately so other arrangements can be made.
- 2.1.3 Notify the RSCC coordinator within 12 hours of sample shipments. Calling in sample shipments to the RSCC coordinator is MANDATORY. Provide the following information to the RSCC coordinator:
 - 1. Case number
 - 2. Name of Laboratory
 - 3. Date of shipment
 - 4. Carrier and airbill number
 - 5. Number of samples shipped by matrix and analysis type
 - 6. Number of coolers shipped
 - 7. Information on completions, changes, delays, etc.

2.2 Special shipments (i.e., Saturday delivery/pickup)

- 2.2.1 General - Friday shipments for Saturday delivery/pickup must be called in by noon (12:00 pm) Friday. This is to enable the RSCC coordinator to pass the information on to CLASS or to the laboratories. Samplers may not contact the laboratories directly. (Laboratories do not have to accept notification of delivery of samples from sources other than CLASS or RSCC.)
- 2.2.2 Regional Laboratory - The Regional Laboratory is located within a gated compound that is closed on weekends and holidays. Designated laboratory personnel will pickup the samples at the Federal Express office, take them to the laboratory and place them inside the refrigerators. If the following shipping instructions are not followed, an unsuccessful delivery attempt will be made to the Regional Laboratory. In addition, the staff member on call will not be able to pickup the samples, since they will not be at the Federal Express office.

To ensure that samples are held at the Federal Express office, please be sure to complete the following items:

- 1. On the lower left side of the Federal Express airbill, "For HOLD at FedEx Location check here," mark the box for "Hold Saturday."

2. In Section 3 of the airbill, print the following Federal Express office address:

1600 63rd Street
Emeryville, CA 94608

Federal Express may affix stickers to the coolers. Be sure they read "SATURDAY FEDERAL EXPRESS CENTER HOLD" or something similar. Under no circumstances should a "SATURDAY DELIVERY" sticker be placed on the cooler.

If a carrier other than Federal Express is used, please call the RSCC coordinator (415-744-1498) to make special arrangements.

- 2.2.3 Most CLP laboratories and other commercial laboratories contracted by QAP are staffed on Saturdays. Therefore, coolers can be delivered directly to these laboratories. In this case, the "SATURDAY DELIVERY" sticker should be placed on the cooler.
- 2.2.4 Laboratories may request advance notification of the arrival of certain types of samples, such as samples with very short holding times (e.g., Cr +6) that will be hand delivered to the laboratory. Required deadlines for notification of sample shipments in these special cases will be determined on a case by case basis. The RSCC coordinator will inform the samplers as to when notification of sample delivery is required (e.g., by noon on the day samples will be delivered). This is to facilitate the laboratory(ies) having personnel available to analyze the samples as soon as they arrive.

2.3 Cooler Return

Samplers are responsible for providing laboratories with a means to return coolers to their place of origin. The easiest way is to enclose an airbill with return shipping instructions (i.e., the address filled in as to where the coolers are to be returned to) and an account number to charge shipping costs to.

Samplers using EMFAC coolers should refer to Section 7 of the EMFAC Users Guide for cooler return instructions. EPA contractors should contact their EPA Project Officer for details on acceptable modes of cooler return and shipping cost reimbursement.

3.0 **CLP ANALYTICAL SERVICES (CLPAS) TRAFFIC REPORT/CHAIN-OF-CUSTODY FORMS FOR ORGANIC AND INORGANIC ANALYSES**

3.1 CASE DOCUMENTATION

Complete this form when collecting CLPAS samples. See Attachments 1 through 3 for examples.

Enter the CLPAS case number in the box(es) located in the upper right corner of the form. CLPAS case numbers have the format "xxxxx" (e.g., 18123).

3.2 HEADER INFORMATION

3.2.1 Box 1 - PROJECT CODE/SITE INFORMATION

Enter the Project Code (i.e., \$F), Site Name, City, State, Site Spill ID. **(Note: the information entered here does not go through to the laboratory's copies.)**

If sampling is not under the Superfund program, enter the Account code (account to be billed), any Regional Information and the name of the program (e.g., RCRA) in the box titled "Non-Superfund program."

3.2.2 Box 2 - REGIONAL INFORMATION

Enter the Region number, the name of your sampling company, and your name and signature in the designated spaces.

3.2.3 Box 3 - TYPE OF ACTIVITY

Check the appropriate box(es) for the type of activity for this sampling event. See Appendix A for acronym definitions.

3.2.4 Box 4 - SHIPPING INFORMATION

Enter the date shipped, the carrier (e.g., Federal Express, Airbourne, etc.) and the air bill number in the appropriate spaces.

3.2.5 Box 5 - SHIP TO

Enter the laboratory name, full address and laboratory contact (e.g., Sample Custodian).

3.2.6 Box 6 - PRESERVATIVE

This box provides a list of commonly used preservatives. Enter the appropriate preservative in Column D. If you enter "5" on the Organic Traffic Report or "7" on the Inorganic Traffic Report indicating "Other", specify the preservative used at the bottom of the "Sample Documentation" area.

If you are using more than one type of preservative, you may either note the preservatives in the box specifically under the requested analyses (e.g., in the Cyanide box enter "2") or list them, separated by commas, in the same order as the checked sample analyses. (Alternatively, the analyses may be listed on separate lines.)

3.2.7 Box 7 - SAMPLE DESCRIPTION

This box provides a list of the description/matrices of the samples that are collected. Enter the appropriate description in Column A.

3.3 SAMPLE DOCUMENTATION

3.3.1 SAMPLE NUMBERS

Carefully transcribe the CLPAS sample numbers from the printed labels onto the Organic or Inorganic Traffic Report/Chain-of-Custody forms in the column labeled "CLP Sample Numbers".

CLPAS sample numbers have the following formats: YX123 for organic and MYX123 for inorganic samples. See Appendix B for examples.

3.3.2 Column A - SAMPLE DESCRIPTION

Enter the appropriate sample description code from Box 7.

Note: Item #6 "Oil" and Item #7 "Waste" are for RAP projects only. Do not ship oily samples or waste samples without making prior arrangements with the EPA.

3.3.3 Column B - CONCENTRATION

Enter "L" for low and "M" for medium concentration samples. (Prior arrangements must have been made with the ESAT RSCC coordinator, CLASS and the laboratories accepting the samples before shipping medium concentration samples. At this time, high concentration samples must be scheduled through the RAP system.)

NOTE: Medium concentration samples must be shipped in metal cans.

3.3.4 Column C - SAMPLE TYPE COMPOSITE/GRAB

Enter the type of sample you collected. A composite is a sample composed of more than one discrete sample. A grab is a discrete sample.

3.3.5 Column D - PRESERVATIVE USED

Enter the preservative used from Box 6.

3.3.6 Column E - CLPAS ANALYSIS

Check the analytical fractions requested for each sample, for example, VOAs, BNAs and Pesticides/PCBs are for low/medium concentration organics. Total metals and cyanide are for low/medium concentration inorganics.

NOTE: If dissolved metals are requested, a note must be added indicating that the samples have been field filtered and that digestion is required. See Attachment 2 for an example.

3.3.7 Column F - REGIONAL SPECIFIC TRACKING NUMBERS OR TAG NUMBERS

Region 9 does not issue tracking numbers or tag numbers. Samplers may use this column for sampler specific tracking numbers or for "Special Instructions". If you choose to use this as "Special Instructions", be sure to note, at the bottom of the "Sample Documentation" area, what the special

handling is. The number and type of containers could be entered here.
(e.g., 3-40 mL, 6-1L)

3.3.8 Column G - STATION LOCATION NUMBER

Enter the station location in the space provided.

3.3.9 Column H - MO/DAY/YEAR/TIME OF SAMPLE COLLECTION

Record the month, day, year and time (use military time, e.g., 1600 = 4:00 pm) of sample collection.

3.3.10 Column I - SAMPLER INITIALS

Enter your initials.

3.3.11 Column J - CORRESPONDING CLP ORGANIC/INORGANIC SAMPLE NUMBER

Enter the corresponding CLP sample number for organic or inorganic CLPAS analysis.

3.3.12 Column K - DESIGNATED FIELD QC

NOTE: This column is NOT to be used for the designated laboratory QC samples. **Information entered here is not reproduced onto the laboratories' copies.**

Enter the appropriate qualifier as listed below for "Blind" Field QC samples in this column. (NOTE: All samples must have a qualifier.)

| <u>Blind Field QC</u> | <u>Qualifier</u> |
|----------------------------|------------------|
| Blind Blanks (field, etc.) | B |
| Blind Field Duplicates | D |
| Blind Field Spikes | S |
| Blind PE Samples | PE |
| All other field samples | -- |

"B" = These are blanks and include trip blanks (T), field blanks (F) and equipment blanks (E). Blanks may be further identified by the letter in parenthesis. For example, B(T) indicates that the sample is a trip blank.

"D" = These are field duplicates. Do not include samples designated as laboratory duplicates. The primary sample is identified with "--" and the duplicate is given "D" in column K. In addition, the station locations should also identify the primary and duplicate samples. For example, MW-1 is the primary sample and MW-1B is the duplicate sample.

"S" = These are spiked field samples and are generated by field personnel

"PE" = These are performance evaluation samples. They are spiked samples but are not field samples. They are usually prepared by other than field personnel.

--" = All other samples not designated as blind field QC samples
are given this qualifier.

- 3.4 "SHIPMENT FOR CASE COMPLETE (Y/N)"
- This should reflect the status of the samples scheduled to be shipped to a laboratory for a specific case. Only when ALL samples scheduled for shipment to a laboratory for a specific case have been shipped is the case complete.
- 3.5 "PAGE 1 OF ____"
- Enter the number of Traffic Report/Chain-of-Custody Record form(s) enclosed in each cooler. The form(s) accompanying each cooler must list only those samples contained in that cooler.
- 3.6 "SAMPLE USED FOR SPIKE AND/OR DUPLICATE"
- Enter the sample number of the sample designated for laboratory spike and/or duplicate analysis. This is also known as the Laboratory QC sample. This sample should be included in the first shipment to the laboratory and in the first shipment for each subsequent sample delivery group (SDG).
- DO NOT** enter samples designated as blind field duplicates in this block.
- 3.7 "ADDITIONAL SAMPLER SIGNATURES"
- Record additional sampler signatures that are different from that in Box 2.
- 3.8 "CHAIN OF CUSTODY SEAL NUMBER"
- Enter the Chain of Custody Seal Number used to seal the cooler, if applicable.
- 3.9 Instructions summarizing CLP sample volumes, packaging and shipment reporting requirements are printed on the back of the Traffic Reports.
- 4.0 **REGIONAL ANALYTICAL PROGRAM (RAP) CHAIN-OF-CUSTODY FORMS**
- 4.1 CASE DOCUMENTATION
- Complete this form when collecting RAP samples. See Attachment 4 for an example.
- 4.1.1 PROJECT NUMBER
- Enter the RAP case number in this box.
- 4.1.2 PROJECT NAME
- Leave this space blank.
- 4.1.3 SAMPLERS (Signature)
- Record all sampler signatures in this box.

4.2 SAMPLE DOCUMENTATION

4.2.1 SAMPLE NUMBERS

No sample numbers are provided. Samplers should designate their own numbers and enter them in the space labeled STA.NO.

4.2.2 DATE

Enter the month, day and year the sample was collected in the "DATE" column.

4.2.3 TIME

Enter the time (using military time) in the "TIME" column.

4.2.4 COMP/GRAB

Check the kind of sample collected in the composite or grab column.

4.2.5 STATION LOCATION

Enter the sample site location in the space provided.

4.2.6 SAMPLE MATRIX

For each sample, enter the appropriate sample matrix description in the right third portion of the "STATION LOCATION" column.

4.2.7 NO. OF CONTAINERS

Enter the total number of sample containers collected for each matrix at each station location.

4.2.8 SAMPLE ANALYSES

There are six slanted columns to be used to specify the kind of analysis to be performed by the laboratory. Enter the appropriate analysis in each column. Mark the box of the appropriate analysis for each sample collected.

4.2.9 REMARKS

The items listed below are to be included in this area on the appropriate sample line.

4.2.9.1 CONCENTRATION

Enter "L" for low concentration, "M" for medium concentration and "H" for high concentration.

NOTE: Medium and high concentration samples must be shipped in metal cans.

4.2.9.2 PRESERVATIVE USED

Enter the preservative used.

If more than one type of preservative is used for a sample, separate the preservative references with commas. The sequence of the reference numbers must follow the sequence of the requested "RAP Analysis" parameters that are recorded in the analysis columns.

4.2.9.3 SAMPLE USED FOR SPIKE AND/OR DUPLICATE

Enter the sample number designated for spike and/or duplicate analysis. This is also known as the Laboratory QC sample. This sample should be included in the first shipment to the laboratory and in the first shipment for each subsequent sample delivery group (SDG).

4.3 AIRBILL NUMBER

The airbill number should be entered on the first signature line, in the box marked "Received by: (Signature)".

4.4 "REMARKS" BOX

Located in the lower right hand corner of the Chain of Custody is a box labeled "Remarks". The following items should be entered there.

4.4.1 CHAIN OF CUSTODY SEAL NUMBER

Enter the Chain of Custody Seal Number used to seal the coolers, if applicable, in the box labeled "Remarks", in the lower right-hand corner.

4.4.2 LABORATORY NAME

Enter the Laboratory name in the box labeled "Remarks", in the lower right-hand corner.

4.4.3 SHIPPING COMPLETE?

Enter "yes, shipping is complete" or "No, shipping is not complete" in the box labeled "Remarks", in the lower right-hand corner.

4.4.4 CARRIER

Enter the carrier (e.g., "Fed Ex") in the box labeled "Remarks", in the lower right-hand corner.

5.0 **SAMPLE BOTTLES**

5.1 Sample bottles be labeled with the following information:

- a. Case number
- b. Date/Time of collection
- c. Matrix/Concentration
- d. Station Location
- e. Sample number (CLP or sampler designated)
- f. Analysis
- g. Preservative

5.2 Pre-printed, self-adhesive labels are provided for CLPAS Organic, CLPAS Inorganic and RAP samples.

5.2.1 Transcribe the appropriate sample number onto the corresponding bottle label and/or affix the sample number label onto the bottle.

5.2.2 Destroy all unused labels or return them to the ESAT RSCC coordinator. DO NOT use them for future samplings. New sample numbers will be assigned.

6.0 **FIELD QA/QC SUMMARY FORM**

6.1 Complete one form per laboratory per matrix for each sampling event. For long term projects, complete a form(s) after each week of sampling. Complete the header portion even if no QA/QC samples were provided.

6.2 Complete all applicable entries. Please use the appropriate sample numbers for each laboratory. (e.g., for the laboratory performing CLPAS organics, use the CLP organic sample numbers, YX123, etc. For the laboratory performing RAP analyses, use the RAP sample numbers, SY0123, etc.) Please do not use station locations. If a laboratory is performing more than one type of analysis, list all applicable sample numbers.

6.3 This form is very important for validation purposes. The validators will compare the results of duplicates and assess the quality of blanks, if they know which samples they are. Failure to provide this information will delay the completion of validation.

Appendix A

TYPE OF ACTIVITY

Check the box which describes the funding lead for this sampling event:

Funding Lead

SF = Superfund
PRP = Potentially Responsible Party
ST = State
FED = Federal

Check one or more boxes, as appropriate, which describe the task of this sampling event:

Pre-Remedial

PA = Preliminary Assessment
SSI = Screening Site Investigation
LSI = Listing Site Investigation

Remedial

RIFS = Remedial Investigation Feasibility Study
RD = Remedial Design
O&M = Operations and Maintenance
NPLD = National Priorities List

Removal

CLEM = Classic Emergency
REMA = Removal Assessment
REM = Removal
OIL = Oil Response
UST = Underground Storage Tank Response

Appendix B

CLP SAMPLE NUMBERS

Each sample is assigned a unique sample number. A "sample" is defined as follows:

- one matrix, e.g., water, soil/sediment, fish, etc.
- one station location
- one analytical program, e.g., CLPAS organics, CLPAS inorganics or a RAP analysis
- one laboratory

Sample numbers for CLPAS analyses:

- CLPAS Organic sample numbers consist of five alpha-numerics, always beginning with "Y"

Example - YJ386

- CLPAS Inorganic sample numbers consist of six alpha-numerics, always beginning with "MY"

Example - MYG528

Examples for assigning sample numbers:

- CLPAS Volatiles & CLPAS Pesticides/PCBs receive the **SAME SAMPLE NUMBER**, if the samples are:
 - the same matrix
 - part of the same analytical program, e.g., CLPAS organics
 - from the same station location
 - going to the same laboratory
- CLPAS Volatiles & CLPAS Pesticides/PCBs receive **DIFFERENT SAMPLE NUMBERS**, if the samples are:
 - the same matrix
 - part of the same analytical program, e.g., CLPAS organics
 - from the same station location
 - going to different laboratories
- CLPAS Volatiles & CLPAS Metals receive **DIFFERENT SAMPLE NUMBERS**, if the samples are:
 - the same matrix
 - part of different analytical programs, e.g., CLPAS organics & CLPAS inorganics
 - from the same station location
 - going to the same laboratory

APPENDIX D:
EPA ERT SOP #2001
(GENERAL FIELD SAMPLING
GUIDELINES)



GENERAL FIELD SAMPLING GUIDELINES

SOP#: 2001
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general field sampling guidelines that will assist REAC personnel in choosing sampling strategies, location, and frequency for proper assessment of site characteristics. This SOP is applicable to all field activities that involve sampling.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a hazardous waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of

material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures. These issues will be discussed in this procedure.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected, and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest. Sample preservation, containers, handling, and storage for air and waste samples are discussed in the specific SOPs for air and waste sampling techniques.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The nature of the object or materials being sampled may be a potential problem to the sampler. If a material is homogeneous, it will generally have a uniform composition throughout. In this case, any sample increment can be considered representative of the material. On the other hand, heterogeneous samples present problems to the sampler because of changes in the material over distance, both laterally and vertically.

Samples of hazardous materials may pose a safety threat to both field and laboratory personnel. Proper health and safety precautions should be implemented when handling this type of sample.

Environmental conditions, weather conditions, or non-target chemicals may cause problems and/or interferences when performing sampling activities or when sampling for a specific parameter. Refer to the specific SOPs for sampling techniques.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

6.0 REAGENTS

Reagents may be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURE

7.1 Types of Samples

In relation to the media to be sampled, two basic types of samples can be considered: the environmental sample and the hazardous sample.

Environmental samples are those collected from streams, ponds, lakes, wells, and are off-site samples that are not expected to be contaminated with hazardous materials. They usually do not require the special handling procedures typically used for concentrated wastes. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples.

Hazardous or concentrated samples are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, or areas previously identified as contaminated, and require special handling procedures because of their potential toxicity or hazard. These samples can be further subdivided based on their degree of hazard; however, care should be taken when handling and shipping any wastes believed to be concentrated regardless of the degree.

The importance of making the distinction between environmental and hazardous samples is two-fold:

- (1) Personnel safety requirements: Any sample thought to contain enough hazardous materials to pose a safety threat should be designated as hazardous and handled in a manner which ensures the safety of both field and laboratory personnel.
- (2) Transportation requirements: Hazardous samples must be packaged, labeled, and shipped according to the International Air Transport Association (IATA) Dangerous Goods Regulations or Department of Transportation (DOT) regulations and U.S. EPA guidelines.

7.2 Sample Collection Techniques

In general, two basic types of sample collection techniques are recognized, both of which can be used for either environmental or hazardous samples.

Grab Samples

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

Composite Samples

Composites are nondiscrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can in certain instances be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have

been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

For sampling situations involving hazardous wastes, grab sampling techniques are generally preferred because grab sampling minimizes the amount of time sampling personnel must be in contact with the wastes, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur due to compositing.

7.3 Types of Sampling Strategies

The number of samples that should be collected and analyzed depends on the objective of the investigation. There are three basic sampling strategies: random, systematic, and judgmental sampling.

Random sampling involves collection of samples in a nonsystematic fashion from the entire site or a specific portion of a site. Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established. When judgmental sampling is performed, samples are collected only from the portion(s) of the site most likely to be contaminated. Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

7.4 QA Work Plans (QAWP)

A QAWP is required when it becomes evident that a field investigation is necessary. It should be initiated in conjunction with, or immediately following, notification of the field investigation. This plan should be clear and concise and should detail the following basic components, with regard to sampling activities:

- C Objective and purpose of the investigation.
- C Basis upon which data will be evaluated.
- C Information known about the site including location, type and size of the facility, and length of operations/abandonment.
- C Type and volume of contaminated material, contaminants of concern (including

concentration), and basis of the information/data.

- C Technical approach including media/matrix to be sampled, sampling equipment to be used, sample equipment decontamination (if necessary), sampling design and rationale, and SOPs or description of the procedure to be implemented.
- C Project management and reporting, schedule, project organization and responsibilities, manpower and cost projections, and required deliverables.
- C QA objectives and protocols including tables summarizing field sampling and QA/QC analysis and objectives.

Note that this list of QAWP components is not all-inclusive and that additional elements may be added or altered depending on the specific requirements of the field investigation. It should also be recognized that although a detailed QAWP is quite important, it may be impractical in some instances. Emergency responses and accidental spills are prime examples of such instances where time might prohibit the development of site-specific QAWPs prior to field activities. In such cases, investigators would have to rely on general guidelines and personal judgment, and the sampling or response plans might simply be a strategy based on preliminary information and finalized on site. In any event, a plan of action should be developed, no matter how concise or informal, to aid investigators in maintaining a logical and consistent order to the implementation of their task.

7.5 Legal Implications

The data derived from sampling activities are often introduced as critical evidence during litigation of a hazardous waste site cleanup. Legal issues in which sampling data are important may include cleanup cost recovery, identification of pollution sources and responsible parties, and technical validation of remedial design methodologies. Because of the potential for involvement in legal actions, strict adherence to technical and administrative SOPs is essential during both the development and implementation of sampling activities.

Technically valid sampling begins with thorough planning and continues through the sample collection and analytical procedures. Administrative requirements involve thorough, accurate

documentation of all sampling activities. Documentation requirements include maintenance of a chain of custody, as well as accurate records of field activities and analytical instructions. Failure to observe these procedures fully and consistently may result in data that are questionable, invalid and non-defensible in court, and the consequent loss of enforcement proceedings.

8.0 CALCULATIONS

Refer to the specific SOPs for any calculations which are associated with sampling techniques.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/QC samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QA/QC activities which are associated with sampling techniques.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures.



SOIL SAMPLING

SOP#: 2012
DATE: 11/16/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT/APPARATUS

Soil sampling equipment includes the following:

- C Sampling plan
- C Maps/plot plan
- C Safety equipment, as specified in the Health and Safety Plan
- C Survey equipment
- C Tape measure
- C Survey stakes or flags
- C Camera and film
- C Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- C Appropriate size sample containers
- C Ziplock plastic bags
- C Logbook
- C Labels
- C Chain of Custody records and seals
- C Field data sheets
- C Cooler(s)
- C Ice
- C Vermiculite
- C Decontamination supplies/equipment
- C Canvas or plastic sheet
- C Spade or shovel

- C Spatula
- C Scoop
- C Plastic or stainless steel spoons
- C Trowel
- C Continuous flight (screw) auger
- C Bucket auger
- C Post hole auger
- C Extension rods
- C T-handle
- C Sampling trier
- C Thin wall tube sampler
- C Split spoons
- C Vehimeyer soil sampler outfit
 - Tubes
 - Points
 - Drive head
 - Drop hammer
 - Puller jack and grip
- C Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site

factors, including extent and nature of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. Care should be exercised to avoid use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.
2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.
3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or

other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of three feet.

The following procedure will be used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.
2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the

drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.
4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect the sample after the auger is removed from the boring and proceed to Step 10.
5. Remove auger tip from drill rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.
6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.
7. Remove the tube sampler, and unscrew the drill rods.
8. Remove the cutting tip and the core from the device.
9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.
10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the

caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.
12. Abandon the hole according to applicable State regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure will be used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.
2. Rotate the trier once or twice to cut a core of material.
3. Slowly withdraw the trier, making sure that the slot is facing upward.
4. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the

caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

The procedure for split spoon sampling describes the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D 1586-67 (reapproved 1974).

The following procedures will be used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.
2. Place the sampler in a perpendicular position on the sample material.
3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.
4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.
5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler

is typically available in 2 and 3 1/2 inch diameters. However, in order to obtain the required sample volume, use of a larger barrel may be required.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

These relatively large excavations are used to remove sections of soil, when detailed examination of soil characteristics (horizontal, structure, color, etc.) are required. It is the least cost effective sampling method due to the relatively high cost of backhoe operation.

The following procedures will be used for collecting soil samples from test pit/trench excavations:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of utility lines, subsurface pipes and poles (subsurface as well as above surface).
2. Using the backhoe, a trench is dug to approximately three feet in width and approximately one foot below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.
3. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.
4. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.
5. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a

stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials,

follow U.S. EPA, OHSA and corporate health and safety procedures.

12.0 REFERENCES

Mason, B.J., Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason, Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

U.S. EPA. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. 1984 EPA-600/4-84-076.

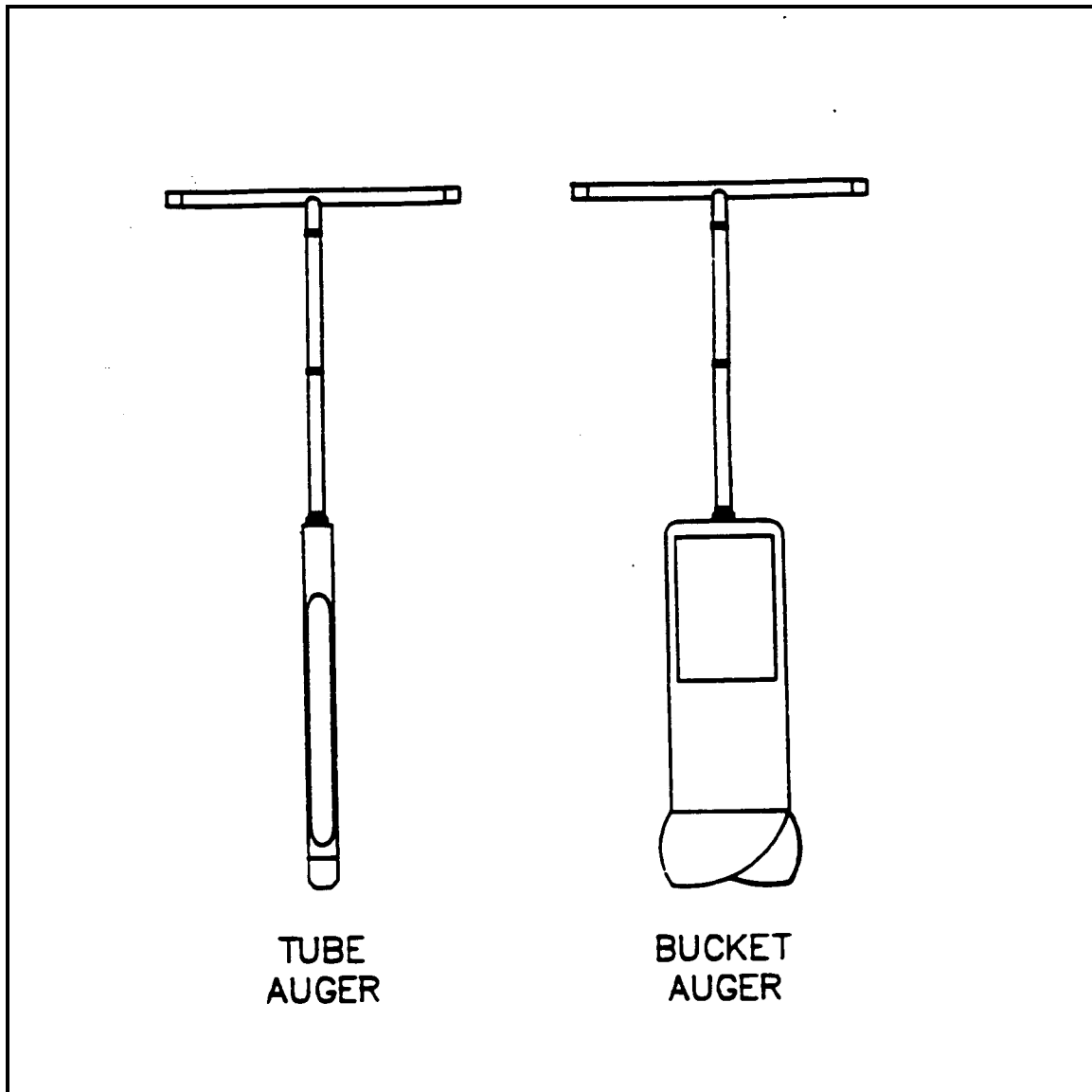
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ASTM D 1586-67 (reapproved 1974), ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A

Figures

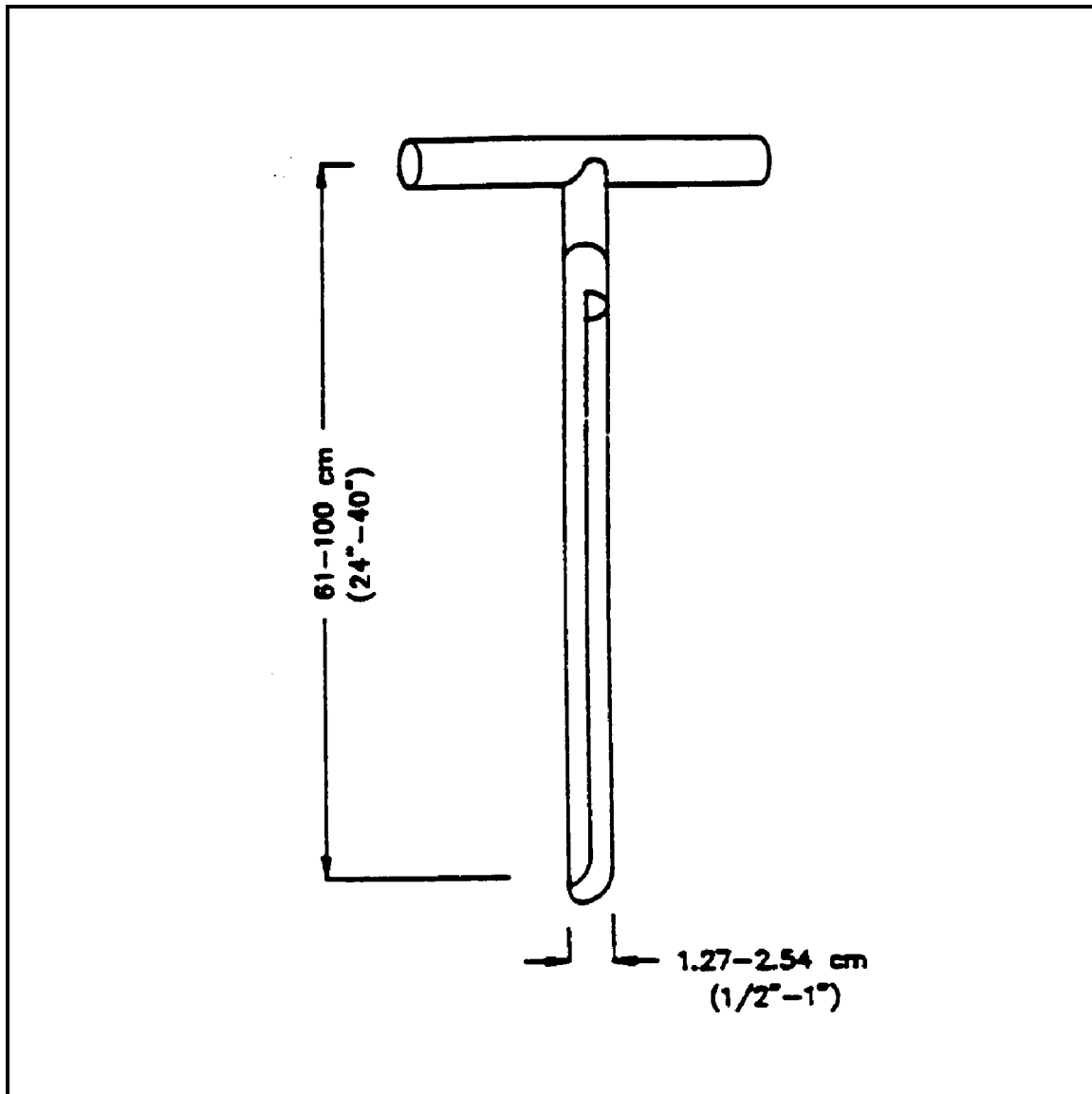
FIGURE 1. Sampling Augers



APPENDIX A (Cont'd)

Figures

FIGURE 2. Sampling Trier





SAMPLING EQUIPMENT DECONTAMINATION

SOP#: 2006
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination and to provide general guidelines for developing decontamination procedures for sampling equipment to be used during hazardous waste operations as per 29 Code of Federal Regulations (CFR) 1910.120. This SOP does not address personnel decontamination.

These are standard (i.e. typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances.

Gross contamination can be removed by physical decontamination procedures. These abrasive and non-abrasive methods include the use of brushes, air and wet blasting, and high and low pressure water cleaning.

The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure

water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. An acid rinse provides a low pH media for trace metals removal and is included in the decontamination process if metal samples are to be collected. It is followed by another distilled/deionized water rinse. If sample analysis does not include metals, the acid rinse step can be omitted. Next, a high purity solvent rinse is performed for trace organics removal if organics are a concern at the site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. Acetone is typically chosen because it is an excellent solvent, miscible in water, and not a target analyte on the Priority Pollutant List. If acetone is known to be a contaminant of concern at a given site or if Target Compound List analysis (which includes acetone) is to be performed, another solvent may be substituted. The solvent must be allowed to evaporate completely and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

The decontamination procedure described above may be summarized as follows:

1. Physical removal
2. Non-phosphate detergent wash
3. Tap water rinse
4. Distilled/deionized water rinse
5. 10% nitric acid rinse
6. Distilled/deionized water rinse
7. Solvent rinse (pesticide grade)
8. Air dry
9. Distilled/deionized water rinse

If a particular contaminant fraction is not present at the site, the nine (9) step decontamination procedure specified above may be modified for site specificity. For example, the nitric acid rinse may be eliminated if metals are not of concern at a site. Similarly, the solvent rinse may be eliminated if organics are not of

concern at a site. Modifications to the standard procedure should be documented in the site specific work plan or subsequent report.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest.

More specifically, sample collection and analysis of decontamination waste may be required before beginning proper disposal of decontamination liquids and solids generated at a site. This should be determined prior to initiation of site activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

- C The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free (specifically for the contaminants of concern).
- C The use of an untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal or industrial water treatment system.
- C If acids or solvents are utilized in decontamination they raise health and safety, and waste disposal concerns.
- C Damage can be incurred by acid and solvent washing of complex and sophisticated sampling equipment.

5.0 EQUIPMENT/APPARATUS

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations include the ease of decontaminating or disposing of the equipment. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handled bottle brushes can be used to remove contaminants. Large galvanized wash tubs, stock tanks, or buckets can hold wash and rinse solutions. Children's wading pools can

also be used. Large plastic garbage cans or other similar containers lined with plastic bags can help segregate contaminated equipment. Contaminated liquid can be stored temporarily in metal or plastic cans or drums.

The following standard materials and equipment are recommended for decontamination activities:

5.1 Decontamination Solutions

- C Non-phosphate detergent
- C Selected solvents (acetone, hexane, nitric acid, etc.)
- C Tap water
- C Distilled or deionized water

5.2 Decontamination Tools/Supplies

- C Long and short handled brushes
- C Bottle brushes
- C Drop cloth/plastic sheeting
- C Paper towels
- C Plastic or galvanized tubs or buckets
- C Pressurized sprayers (H₂O)
- C Solvent sprayers
- C Aluminum foil

5.3 Health and Safety Equipment

Appropriate personal protective equipment (i.e., safety glasses or splash shield, appropriate gloves, aprons or coveralls, respirator, emergency eye wash)

5.4 Waste Disposal

- C Trash bags
- C Trash containers
- C 55-gallon drums
- C Metal/plastic buckets/containers for storage and disposal of decontamination solutions

6.0 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions. Table 1 (Appendix A) lists solvent rinses which may be required for elimination of particular chemicals. In general, the following solvents are typically utilized for decontamination purposes:

- C 10% nitric acid is typically used for inorganic compounds such as metals. An acid rinse may not be required if inorganics are not a contaminant of concern.
- C Acetone (pesticide grade)⁽¹⁾
- C Hexane (pesticide grade)⁽¹⁾
- C Methanol⁽¹⁾

⁽¹⁾ - Only if sample is to be analyzed for organics.

7.0 PROCEDURES

As part of the health and safety plan, a decontamination plan should be developed and reviewed. The decontamination line should be set up before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- C The number, location, and layout of decontamination stations.
- C Decontamination equipment needed.
- C Appropriate decontamination methods.
- C Methods for disposal of contaminated clothing, equipment, and solutions.
- C Procedures can be established to minimize the potential for contamination. This may include: (1) work practices that minimize contact with potential contaminants; (2) using remote sampling techniques; (3) covering monitoring and sampling equipment with plastic, aluminum foil, or other protective material; (4) watering down dusty areas; (5) avoiding laying down equipment in areas of obvious contamination; and (6) use of disposable sampling equipment.

7.1 Decontamination Methods

All samples and equipment leaving the contaminated area of a site must be decontaminated to remove any contamination that may have adhered to equipment. Various decontamination methods will remove contaminants by: (1) flushing or other physical action, or (2) chemical complexing to inactivate contaminants by neutralization, chemical reaction, disinfection, or sterilization.

Physical decontamination techniques can be grouped into two categories: abrasive methods and non-abrasive methods, as follows:

7.1.1 Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The mechanical abrasive cleaning methods are most commonly used at hazardous waste sites. The following abrasive methods are available:

Mechanical

Mechanical methods of decontamination include using metal or nylon brushes. The amount and type of contaminants removed will vary with the hardness of bristles, length of time brushed, degree of brush contact, degree of contamination, nature of the surface being cleaned, and degree of contaminant adherence to the surface.

Air Blasting

Air blasting equipment uses compressed air to force abrasive material through a nozzle at high velocities. The distance between nozzle and surface cleaned, air pressure, time of application, and angle at which the abrasive strikes the surface will dictate cleaning efficiency. Disadvantages of this method are the inability to control the amount of material removed and the large amount of waste generated.

Wet Blasting

Wet blast cleaning involves use of a suspended fine abrasive. The abrasive/water mixture is delivered by compressed air to the contaminated area. By using a very fine abrasive, the amount of materials removed can be carefully controlled.

7.1.2 Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off a surface with pressure. In general, the equipment surface is not removed using non-abrasive methods.

Low-Pressure Water

This method consists of a container which is filled with water. The user pumps air out of the container to create a vacuum. A slender nozzle and hose allow the user to spray in hard-to-reach places.

High-Pressure Water

This method consists of a high-pressure pump, an operator controlled directional nozzle, and a high-pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) and flow rates usually range from 20 to 140 liters per minute.

Ultra-High-Pressure Water

This system produces a water jet that is pressured from 1,000 to 4,000 atmospheres. This ultra-high-pressure spray can remove tightly-adhered surface films. The water velocity ranges from 500 meters/second (m/s) (1,000 atm) to 900 m/s (4,000 atm). Additives can be used to enhance the cleaning action.

Rinsing

Contaminants are removed by rinsing through dilution, physical attraction, and solubilization.

Damp Cloth Removal

In some instances, due to sensitive, non-waterproof equipment or due to the unlikelihood of equipment being contaminated, it is not necessary to conduct an extensive decontamination procedure. For example, air sampling pumps hooked on a fence, placed on a drum, or wrapped in plastic bags are not likely to become heavily contaminated. A damp cloth should be used to wipe off contaminants which may have adhered to equipment through airborne contaminants or from surfaces upon which the equipment was set.

Disinfection/Sterilization

Disinfectants are a practical means of inactivating infectious agents. Unfortunately, standard sterilization methods are impractical for large equipment. This method of decontamination is typically performed off-site.

7.2 Field Sampling Equipment Decontamination Procedures

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. The spread of contaminants is further reduced by separating each

decontamination station by a minimum of three (3) feet. Ideally, the contamination should decrease as the equipment progresses from one station to another farther along in the line.

A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC) which is in the CRZ. Figure 1 (Appendix B) shows a typical contaminant reduction zone layout. The CRC controls access into and out of the exclusion zone and confines decontamination activities to a limited area. The CRC boundaries should be conspicuously marked. The far end is the hotline, the boundary between the exclusion zone and the contamination reduction zone. The size of the decontamination corridor depends on the number of stations in the decontamination process, overall dimensions of the work zones, and amount of space available at the site. Whenever possible, it should be a straight line.

Anyone in the CRC should be wearing the level of protection designated for the decontamination crew. Another corridor may be required for the entry and exit of heavy equipment. Sampling and monitoring equipment and sampling supplies are all maintained outside of the CRC. Personnel don their equipment away from the CRC and enter the exclusion zone through a separate access control point at the hotline. One person (or more) dedicated to decontaminating equipment is recommended.

7.2.1 Decontamination Setup

Starting with the most contaminated station, the decontamination setup should be as follows:

Station 1: Segregate Equipment Drop

Place plastic sheeting on the ground (Figure 2, Appendix B). Size will depend on amount of equipment to be decontaminated. Provide containers lined with plastic if equipment is to be segregated. Segregation may be required if sensitive equipment or mildly contaminated equipment is used at the same time as equipment which is likely to be heavily contaminated.

Station 2: Physical Removal With A High-Pressure

Washer (Optional)

As indicated in 7.1.2, a high-pressure wash may be required for compounds which are difficult to remove by washing with brushes. The elevated temperature of the water from the high-pressure washers is excellent at removing greasy/oily compounds. High pressure washers require water and electricity.

A decontamination pad may be required for the high-pressure wash area. An example of a wash pad may consist of an approximately 1 1/2 foot-deep basin lined with plastic sheeting and sloped to a sump at one corner. A layer of sand can be placed over the plastic and the basin is filled with gravel or shell. The sump is also lined with visqueen and a barrel is placed in the hole to prevent collapse. A sump pump is used to remove the water from the sump for transfer into a drum.

Typically heavy machinery is decontaminated at the end of the day unless site sampling requires that the machinery be decontaminated frequently. A separate decontamination pad may be required for heavy equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Prior to setting up Station 3, place plastic sheeting on the ground to cover areas under Station 3 through Station 10.

Fill a wash basin, a large bucket, or child's swimming pool with non-phosphate detergent and tap water. Several bottle and bristle brushes to physically remove contamination should be dedicated to this station. Approximately 10 - 50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 4: Water Basin

Fill a wash basin, a large bucket, or child's swimming pool with tap water. Several bottle and bristle brushes should be dedicated to this station. Approximately 10-50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 5: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to contain the water during the rinsing process. Approximately 10-20 gallons of water may be required initially depending upon the amount of equipment to be decontaminated and the amount of gross contamination.

Station 6: Nitric Acid Sprayers

Fill a spray bottle with 10% nitric acid. An acid rinse may not be required if inorganics are not a contaminant of concern. The amount of acid will depend on the amount of equipment to be decontaminated. Provide a 5-gallon bucket or basin to collect acid during the rinsing process.

Station 7: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 8: Organic Solvent Sprayers

Fill a spray bottle with an organic solvent. After each solvent rinse, the equipment should be rinsed with distilled/deionized water and air dried. Amount of solvent will depend on the amount of equipment to decontaminate. Provide a 5-gallon bucket or basin to collect the solvent during the rinsing process.

Solvent rinses may not be required unless organics are a contaminant of concern, and may be eliminated from the station sequence.

Station 9: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 10: Clean Equipment Drop

Lay a clean piece of plastic sheeting over the bottom plastic layer. This will allow easy removal of the plastic in the event that it becomes dirty. Provide aluminum foil, plastic, or other protective material to wrap clean equipment.

7.2.2 Decontamination Procedures

Station 1: Segregate Equipment Drop

Deposit equipment used on-site (i.e., tools, sampling devices and containers, monitoring instruments radios, clipboards, etc.) on the plastic drop cloth/sheet or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross contamination. Loose leaf sampling data sheets or maps can be placed in plastic zip lock bags if contamination is evident.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

Use high pressure wash on grossly contaminated equipment. Do not use high- pressure wash on sensitive or non-waterproof equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Scrub equipment with soap and water using bottle and bristle brushes. Only sensitive equipment (i.e., radios, air monitoring and sampling equipment) which is waterproof should be washed. Equipment which is not waterproof should have plastic bags removed and wiped down with a damp cloth. Acids and organic rinses may also ruin sensitive equipment. Consult the manufacturers for recommended decontamination solutions.

Station 4: Equipment Rinse

Wash soap off of equipment with water by immersing the equipment in the water while brushing. Repeat as many times as necessary.

Station 5: Low-Pressure Rinse

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 6: Nitric Acid Sprayers (required only if metals are a contaminant of concern)

Using a spray bottle rinse sampling equipment with nitric acid. Begin spraying (inside and outside) at one end of the equipment allowing the acid to drip to the other end into a 5-gallon bucket. A rinsate blank may be required at this station. Refer to Section 9.

Station 7: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 8: Organic Solvent Sprayers

Rinse sampling equipment with a solvent. Begin spraying (inside and outside) at one end of the equipment allowing the solvent to drip to the other end into a 5-gallon bucket. Allow the solvent to evaporate from the equipment before going to the next station. A QC rinsate sample may be required at this station.

Station 9: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure washer.

Station 10 : Clean Equipment Drop

Lay clean equipment on plastic sheeting. Once air dried, wrap sampling equipment with aluminum foil, plastic, or other protective material.

7.2.3 Post Decontamination Procedures

1. Collect high-pressure pad and heavy equipment decontamination area liquid and waste and store in appropriate drum or container. A sump pump can aid in the collection process. Refer to the Department of Transportation (DOT) requirements for appropriate containers based on the contaminant of concern.
2. Collect high-pressure pad and heavy equipment decontamination area solid waste and store in appropriate drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.
3. Empty soap and water liquid wastes from basins and buckets and store in appropriate drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.
4. Empty acid rinse waste and place in appropriate container or neutralize with a base and place in appropriate drum. pH paper or an equivalent pH test is required for

neutralization. Consult DOT requirements for appropriate drum for acid rinse waste.

5. Empty solvent rinse sprayer and solvent waste into an appropriate container. Consult DOT requirements for appropriate drum for solvent rinse waste.
6. Using low-pressure sprayers, rinse basins, and brushes. Place liquid generated from this process into the wash water rinse container.
7. Empty low-pressure sprayer water onto the ground.
8. Place all solid waste materials generated from the decontamination area (i.e., gloves and plastic sheeting, etc.) in an approved DOT drum. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.
9. Write appropriate labels for waste and make arrangements for disposal. Consult DOT regulations for the appropriate label for each drum generated from the decontamination process.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

A rinsate blank is one specific type of quality control sample associated with the field decontamination process. This sample will provide information on the effectiveness of the decontamination process employed in the field.

Rinsate blanks are samples obtained by running analyte free water over decontaminated sampling equipment to test for residual contamination. The blank water is collected in sample containers for handling, shipment, and analysis. These samples are treated identical to samples collected that day. A rinsate blank is used to assess cross contamination brought about by improper decontamination procedures. Where dedicated sampling equipment is

not utilized, collect one rinsate blank per day per type of sampling device samples to meet QA2 and QA3 objectives.

If sampling equipment requires the use of plastic tubing it should be disposed of as contaminated and replaced with clean tubing before additional sampling occurs.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results in accordance with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow OSHA, U.S. EPA, corporate, and other applicable health and safety procedures.

Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

The decontamination solutions must be determined to be acceptable before use. Decontamination materials may degrade protective clothing or equipment; some solvents can permeate protective clothing. If decontamination materials do pose a health hazard, measures should be taken to protect personnel or substitutions should be made to eliminate the hazard. The choice of respiratory protection based on contaminants of concern from the site may not be appropriate for solvents used in the decontamination process.

Safety considerations should be addressed when using abrasive and non-abrasive decontamination equipment. Maximum air pressure produced by abrasive equipment could cause physical injury. Displaced material requires control mechanisms.

Material generated from decontamination activities requires proper handling, storage, and disposal. Personal Protective Equipment may be required for these activities.

Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard (i.e., acetone, alcohol, and trisodiumphosphate).

In some jurisdictions, phosphate containing detergents (i.e., TSP) are banned.

12.0 REFERENCES

Field Sampling Procedures Manual, New Jersey Department of Environmental Protection, February, 1988.

A Compendium of Superfund Field Operations Methods, EPA 540/p-87/001.

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1, 1986.

Guidelines for the Selection of Chemical Protective Clothing, Volume 1, Third Edition, American Conference of Governmental Industrial Hygienists, Inc., February, 1987.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, October, 1985.

APPENDIX A

Table

Table 1. Soluble Contaminants and Recommended Solvent Rinse

| TABLE 1 Soluble Contaminants and Recommended Solvent Rinse | | |
|---|--|--|
| SOLVENT ⁽¹⁾ | EXAMPLES OF SOLVENTS | SOLUBLE CONTAMINANTS |
| Water | Deionized water Tap water | Low-chain hydrocarbons Inorganic compounds Salts Some organic acids and other polar compounds |
| Dilute Acids | Nitric acid Acetic acid Boric acid | Basic (caustic) compounds (e.g., amines and hydrazines) |
| Dilute Bases | Sodium bicarbonate (e.g., soap detergent) | Acidic compounds Phenol Thiols Some nitro and sulfonic compounds |
| Organic Solvents ⁽²⁾ | Alcohols Ethers Ketones Aromatics Straight chain alkalines (e.g., hexane) Common petroleum products (e.g., fuel, oil, kerosene) | Nonpolar compounds (e.g., some organic compounds) |
| Organic Solvent ⁽²⁾ | Hexane | PCBs |

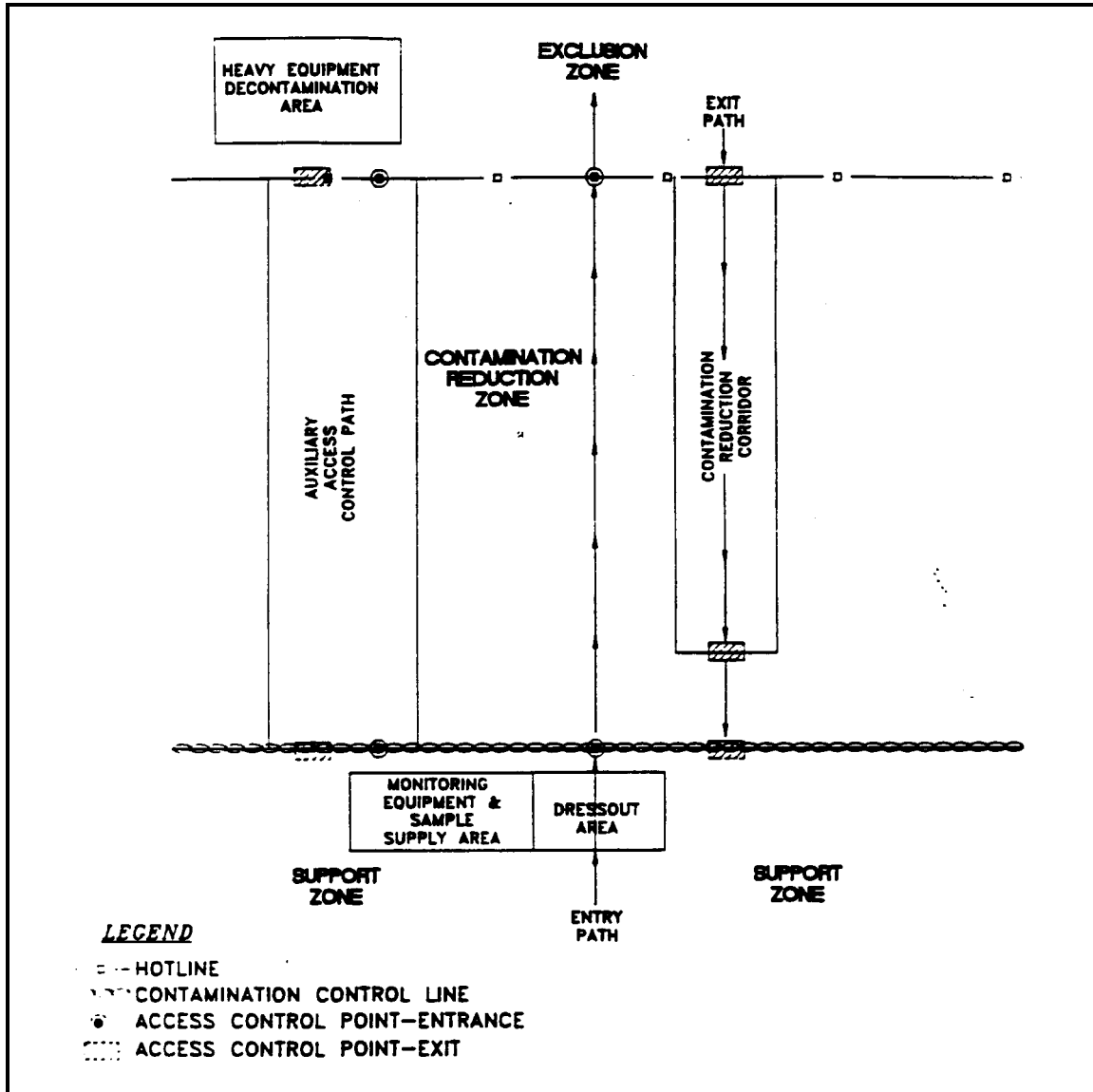
⁽¹⁾ - Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard

⁽²⁾ - WARNING: Some organic solvents can permeate and/or degrade the protective clothing

APPENDIX B

Figures

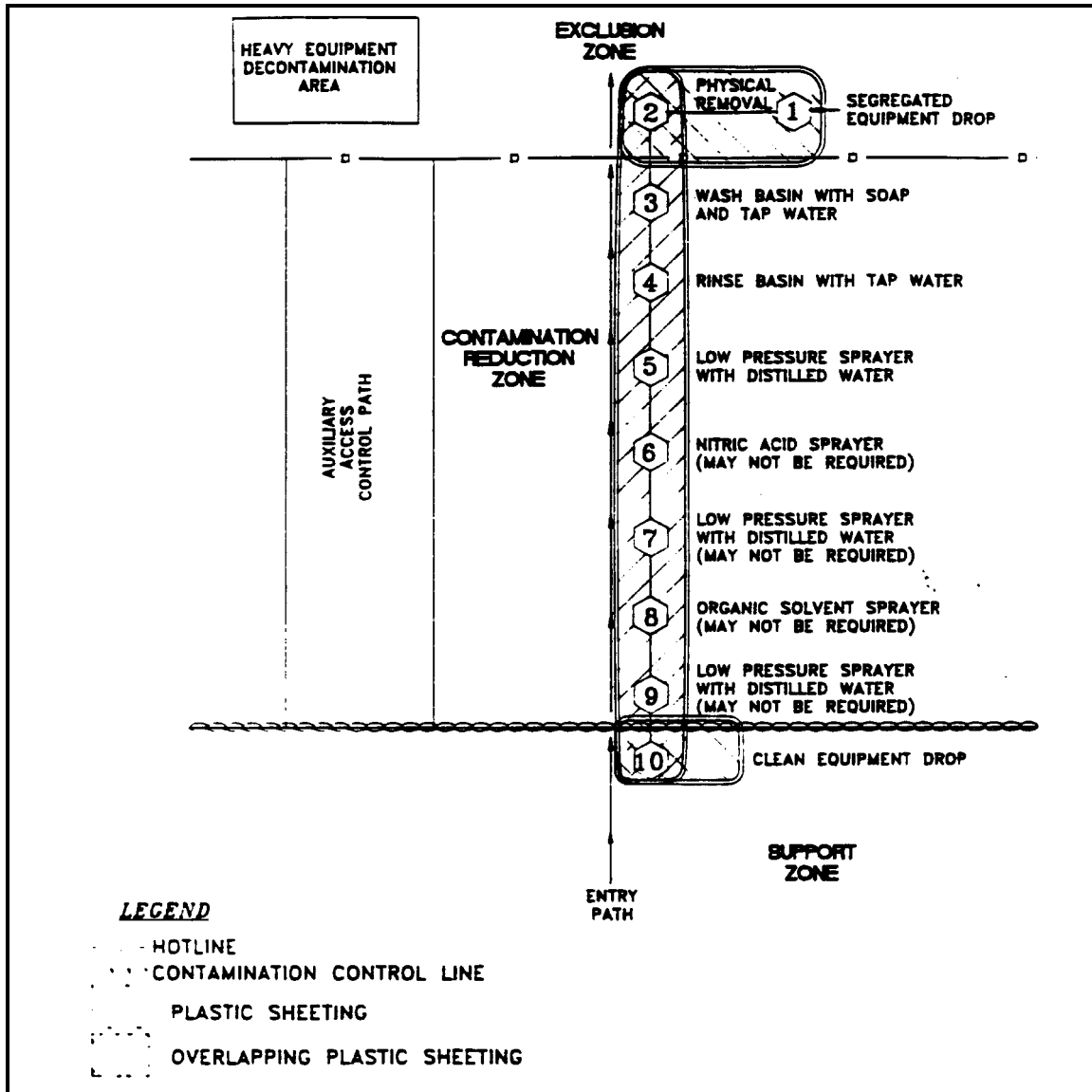
Figure 1. Contamination Reduction Zone Layout



APPENDIX B (Cont'd.)

Figures

Figure 2. Decontamination Layout



APPENDIX E:
EPA ERT SOP #2050
(MODEL 5400 GEOPROBE™
OPERATION)



MODEL 5400 GEOPROBE™ OPERATION

SOP#: 2050
DATE: 03/27/96
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the collection of representative soil, soil-gas, and groundwater samples using a Model 5400 Geoprobe™ sampling device. Any deviations from these procedures should be documented in the site/field logbook and stated in project deliverables.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

The Geoprobe™ sampling device is used to collect soil, soil-gas and groundwater samples at specific depths below ground surface (BGS). The Geoprobe™ is hydraulically powered and is mounted in a customized four-wheel drive vehicle. The base of the sampling device is positioned on the ground over the sampling location and the vehicle is hydraulically raised on the base. As the weight of the vehicle is transferred to the probe, the probe is pushed into the ground. A built-in hammer mechanism allows the probe to be driven through dense materials. Maximum depth penetration under favorable circumstances is about 50 feet. Components of the Model 5400 Geoprobe™ are shown in Figures 1 through 6 (Appendix A).

Soil samples are collected with a specially-designed sample tube. The sample tube is pushed and/or vibrated to a specified depth (approximately one foot above the intended sample interval). The interior plug of the sample tube is removed by inserting small-diameter threaded rods. The sample tube is then driven an additional foot to collect the samples. The probe sections and sample tube are then withdrawn and the sample is extruded from the tube into sample jars.

Soil gas can be collected in two ways. One method

involves withdrawing a sample directly from the probe rods, after evacuating a sufficient volume of air from the probe rods. The other method involves collecting a sample through tubing attached by an adaptor to the bottom probe section. Correctly used, the latter method provides more reliable results.

Slotted lengths of probe can be used to collect groundwater samples if the probe rods can be driven to the water table. Groundwater samples are collected using either a peristaltic pump or a small bailer.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

Refer to specific ERT SOPs for procedures appropriate to the matrix, parameters and sampling objector.

Applicable ERT SOPs include:

ERT #2012, Soil Sampling

ERT #2007, Groundwater Well Sampling

ERT #2042, Soil Gas Sampling

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

A preliminary site survey should identify areas to be avoided with the truck. All underground utilities should be located and avoided during sampling. Begin sampling activities with an adequate fuel supply.

Decontamination of sampling tubes, probe rods, adaptors, non-expendable points and other equipment that contacts the soil is necessary to prevent cross-contamination of samples. During sampling, the bottom portion and outside of the sampling tubes can be contaminated with soil from other depth intervals.

Care must be taken to prevent soil which does not represent the sampled interval from being incorporated into the sample. Excess soil should be carefully wiped from the outside surface of the sampling tube and the bottom 3 inches of the sample should be discarded before extruding the sample into a sample jar.

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent upon the parameter(s) of interest. Guidelines for the containment, preservation, handling and storage of soil-gas samples are described in ERT SOP #2042, Soil-Gas Sampling.

Obtaining sufficient volume of soil for multiple analyses from one sample location may present a problem. The Geoprobe™ soil sampling system recovers a limited volume of soil and it is not possible to reenter the same hole and collect additional soil. When multiple analyses are to be performed on soil samples collected with the Geoprobe™, it is important that the relative importance of the analyses be identified. Identifying the order of importance will ensure that the limited sample volume will be used for the most crucial analyses.

5.0 EQUIPMENT/APPARATUS

Sampling with the Geoprobe™ involves use of the equipment listed below. Some of the equipment is used for all sample types, others are specific to soil (S), soil gas (SG), or groundwater (GW) as noted.

- C Geoprobe™ sampling device
- C Threaded probe rods (36", 24", and 12" lengths)
- C Drive Caps
- C Pull Caps
- C Rod Extractor
- C Expendable Point Holders
- C Expendable Drive Points
- C Solid Drive Points
- C Extension Rods
- C Extension Rod Couplers
- C Extension Rod Handle
- C Hammer Anvil
- C Hammer Latch
- C Hammer Latch Tool
- C Drill Steels
- C Carbide-Tipped Drill Bit

- C Mill-Slotted Well Point (GW)
- C Threaded Drive Point (GW)
- C Well Mini-Bailer (GW)
- C Tubing Bottom Check Valve (GW)
- C 3/8" O.D. Low Density Polyethylene Tubing (GW, SG)
- C Gas Sampling Adaptor and Cap (SG)
- C Teflon Tape
- C Neoprene "O" - Rings (SG)
- C Vacuum System (mounted in vehicle) (SG)
- C Piston Tip (S)
- C Piston Rod (S)
- C Piston Stop (S)
- C Sample Tube (11.5" in length) (S)
- C Vinyl Ends Caps (S)
- C Sample Extruder (S)
- C Extruder Pistons (Wooden Dowels) (S)
- C Wire Brush
- C Brush Adapters
- C Cleaning Brush (Bottle)

6.0 REAGENTS

Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURES

Portions of the following sections have been condensed from the Model 5400 Geoprobe™ Operations Manual(1). Refer to this manual for more detailed information concerning equipment specifications, general maintenance, tools, throttle control, clutch pump, GSK-58 Hammer, and trouble-shooting. A copy of this manual will be maintained with the Geoprobe™ and on file in the Quality Assurance (QA) office.

7.1 Preparation

1. Determine extent of the sampling effort, sample matrices to be collected, and types and amounts of equipment and supplies required to complete the sampling effort.
2. Obtain and organize necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Perform a general site survey prior to site

entry in accordance with the site-specific Health and Safety Plan.

5. Use stakes or flagging to identify and mark all sampling locations. All sample locations should be cleared for utilities prior to sampling.

7.2 Setup of Geoprobe™

1. Back carrier vehicle to probing location.
2. Shift the vehicle to park and shut off ignition.
3. Set parking brake and place chocks under rear tires.
4. Attach exhaust hoses so exhaust blows downwind of the sampling location (this is particularly important during soil gas sampling).
5. Start engine using the remote ignition at the Geoprobe™ operator position.
6. Activate hydraulic system by turning on the Electrical Control Switch located on the Geoprobe™ electrical control panel (Figure 1, Appendix A). When positioning the probe, always use the SLOW speed. The SLOW speed switch is located on the hydraulic control panel (Figure 2, Appendix A).

Important: Check for clearance on vehicle roof before folding Geoprobe™ out of the carrier vehicle.

7. Laterally extend the Geoprobe™ from the vehicle as far as possible by pulling the EXTEND control lever toward the back of the vehicle while the Geoprobe™ is horizontal.
8. Using the FOOT control, lower the Derrick Slide so it is below cylinder (A) before folding the Geoprobe™ out of the carrier vehicle (Figure 3, Appendix A). This will ensure clearance at the roof of the vehicle.
9. Use the FOLD, FOOT, and EXTEND controls to place Geoprobe™ to the exact

probing location. Never begin probing in the fully extended position.

10. Using the FOLD control, adjust the long axis of the probe cylinder so that it is perpendicular (visually) to the ground surface.
11. Using the FOOT control, put the weight of the vehicle on the probe unit. Do not raise the rear of the vehicle more than six inches.

Important: Keep rear vehicle wheels on the ground surface when transferring the weight of the vehicle to the probe unit. Otherwise, vehicle may shift when probing begins.

12. When the probe axis is vertical and the weight of the vehicle is on the probe unit, probing is ready to begin.

7.3 Drilling Through Surface Pavement or Concrete

1. Position carrier vehicle to drilling location.
2. Fold unit out of carrier vehicle.
3. Deactivate hydraulics.
4. Insert carbide-tipped drill bit into hammer.
5. Activate HAMMER ROTATION control by turning knob counter-clockwise (Figure 4, Appendix A). This allows the drill bit to rotate when the HAMMER control is pressed.
6. Press down on HAMMER control to activate counterclockwise rotation.
7. Both the HAMMER control and the PROBE control must be used when drilling through the surface (Figure 4, Appendix A). Fully depress the HAMMER control, and incrementally lower the bit gradually into the pavement by periodically depressing the PROBE control.
8. When the surface has been penetrated, turn the HAMMER Control Valve knob

clockwise to deactivate hammer rotation and remove the drill bit from the HAMMER.

Important: Be sure to deactivate the rotary action before driving probe rods.

7.4 Probing

1. Position the carrier vehicle to the desired sampling location and set the vehicle parking brake.
2. Deploy Geoprobe™ Sampling Device.
3. Make sure the hydraulic system is turned off.
4. Lift up latch and insert hammer anvil into hammer - push latch back in (Figure 5, Appendix A).
5. Thread the drive cap onto the male end of the probe rod.
6. Thread an expendable point holder onto the other end of the first probe rod.
7. Slip an expendable drive point into point holder.
8. Position the leading probe rod with expendable drive point in the center of the derrick foot and directly below the hammer anvil.

Important: Positioning the first probe rod is critical in order to drive the probe rod vertically. Therefore, both the probe rod and the probe cylinder shaft must be in the vertical position (Figure 6, Appendix A).

9. To begin probing, activate the hydraulics and push the PROBE Control downward. When advancing the first probe rod, always use the SLOW speed. Many times the probe rods can be advanced using only the weight of the carrier vehicle. When this is the case, only the PROBE control is used.

Important: When advancing rods, always keep the probe rods parallel to the probe cylinder shaft (Figure 6, Appendix A).

This is done by making minor adjustments with the FOLD control. Failure to keep probe rods parallel to probe cylinder shaft may result in broken rods and increased difficulty in achieving desired sampling depth.

7.5 Probing - Percussion Hammer

The percussion hammer must be used in situations where the weight of the vehicle is not sufficient to advance the probe rods.

1. Make sure the Hammer Rotation Valve is closed.
 2. Using the PROBE control to advance the rod, press down the HAMMER control to allow percussion to drive the rods (Figure 2, Appendix A).
- Important: Always keep static weight on the probe rod or the rod will vibrate and chatter while you are hammering, causing rod threads to fracture and break.**
3. Keep the hammer tight to the drive cap so the rod will not vibrate.
 4. Periodically stop hammering and check if the probe rods can be advanced by pushing only.
 5. Any time the downward progress of the probe rods is refused, the derrick foot may lift off of the ground surface. When this happens, reduce pressure on the PROBE control. Do not allow the foot to rise more than six inches off the ground or the vehicle's wheels may lift off the ground surface, causing the vehicle to shift (Figure 6, Appendix A).
 6. As the derrick foot is raised off the ground surface, the probe cylinder may not be in a perpendicular position. If this happens, use the FOLD control to correct the probe cylinder position.

7.6 Probing - Adding Rods

1. Standard probe rods are three feet in length. If the desired depth is more than three feet,

another rod must be threaded onto the rod that has been driven into the ground. In order to ensure a vacuum-tight seal (soil-gas sampling), two wraps of teflon tape around the thread is recommended.

2. Using the PROBE control, raise the probe cylinder as high as possible.

Important: Always deactivate hydraulics when adding rods.

3. Deactivate hydraulics.
4. Unthread the drive cap from the probe rod that is in the ground.
5. Wrap teflon tape around the threads.
6. Thread the drive cap onto the male end of the next probe rod to be used.
7. After threading the drive cap onto the rod to be added, thread the rod onto the probe rod that has been driven into the ground. Make sure threads have been teflon taped. Continue probing.
8. Continue these steps until the desired sampling depth has been reached.

7.7 Probing/Pulling Rods

1. Once the probe rods have been driven to depth, they can also be pulled using the Geoprobe™ Machine.
2. Turn off the hydraulics.
3. Lift up latch and take the hammer anvil out of the hammer.
4. Replace the drive cap from the last probe rod driven with a pull cap.
5. Lift up the hammer latch.
6. Activate the hydraulics.
7. Hold down on the PROBE control, and move the probe cylinder down until the latch can be closed over the pull cap.

Important: If the latch will not close over the pull cap, adjust the derrick assembly by using the extend control. This will allow you to center the pull cap directly below the hammer latch.

8. Retract the probe rods by pulling up on the PROBE control.

Important: Do not raise the probe cylinder all the way when pulling probe rods or it will be impossible to detach a rod that has been pulled out. However, it is necessary to raise the probe cylinder far enough to allow the next probe section to be pulled.

9. After retracting the first probe rod, lower the probe cylinder only slightly to ease the pressure off of the hammer latch.
10. Attach a clamping device to the base of the rods where it meets the ground to prevent rods from falling back into the hole.
11. Raise the hammer latch.
12. Hold the PROBE control up and raise the probe cylinder as high as possible.
13. Unthread the pull cap from the retracted rod.
14. Unthread the retracted rod.
15. Thread the pull cap onto the next rod that is to be pulled.
16. Continue these steps until all the rods are retracted from the hole.
17. Decontaminate all portions of the equipment that have been in contact with the soil, soil gas and groundwater.

7.8 Soil-Gas Sampling Without Interior Tubing

1. Follow procedures outlined in Sections 7.1 through 7.6.
2. Remove hammer anvil from hammer.

3. Thread on pull cap to end of probe rod.
4. Retract rod approximately six inches. Retraction of the rod disengages expendable drive point and allows for soil vapor to enter rod.
5. Unthread pull cap and replace it with a gas sampling cap. Cap is furnished with barbed hose connector.

Important: Shut engine off before taking sample (exhaust fumes can cause faulty sample data).

6. Turn vacuum pump on and allow vacuum to build in tank.
7. Open line control valve. For each rod used, purge 300 liters of volume. Example: Three rods used = 900 liters = .900 on gauge.
8. After achieving sufficient purge volume, close valve and allow sample line pressure gauge to return to zero. This returns sample train to atmospheric pressure.
9. The vapor sample can now be taken.
 1. Pinch hose near gas sampling cap to prevent any outside vapors from entering the rods.
 2. Insert syringe needle into center of barbed hose connector and withdraw vapor sample.
10. To maintain suction at the sampling location, periodically drain the vacuum tank.
11. To remove rods, follow procedures outlined in Section 7.7.

7.9 Soil-Gas Sampling With Post-Run Tubing (PRT)

1. Follow procedures outlined in Sections 7.1 through 7.6.

2. Retract rod approximately six inches. Retraction of rod disengages expendable drive point and allows for soil vapor to enter rod.
3. Remove pull cap from the end of the probe rod.
4. Position the Geoprobe™ to allow room to work.
5. Secure PRT Tubing Adapter with "O" - Ring to selected tubing.
6. Insert the adapter end of the tubing down the inside diameter of the probe rods.
7. Feed the tubing down the hole until it hits bottom on the expendable point holder. Cut the tubing approximately two feet from the top probe rod.
8. Grasp excess tubing and apply some downward pressure while turning it in a counter-clockwise motion to engage the adapter threads with the expendable point holder.
9. Pull up lightly on the tubing to test engagement of threads.
10. Connect the outer end of the tubing to silicon tubing and vacuum hose (or other sampling apparatus).
11. Follow the appropriate sampling procedure (ERT SOP #2042, Soil Gas Sampling) to collect a soil-gas sample.
12. After collecting a sample, disconnect the tubing from the vacuum hose or sampling system.
13. Pull up firmly on the tubing until it releases from the adapter at the bottom of the hole.
14. Extract the probe rods from the ground and recover the expendable point holder with the attached adapter.

15. Inspect the "O"-ring at the base of the adapter to verify that proper sealing was achieved during sampling. The "O"-ring should be compressed.

Note: If the "O"-ring is not compressed, vapors from within the probe sections may have been collected rather than vapors from the intended sample interval.

7.10 Soil Sampling

1. Follow procedures outlined in Sections 7.1 through 7.6.
2. Assemble soil-sampling tube.
 1. Thread piston rod into piston tip.
 2. Insert piston tip into sample tube, seating piston tip into cutting edge of sample tube.
 3. Thread drive head into threaded end of sample tube.
 4. Thread piston stop pin into drive head. Stop pin should be tightened with wrench so that it exerts pressure against the piston rod.
3. Attach assembled sampler onto leading probe rod.
4. Drive the sampler with the attached probe rods to the top of the interval to be sampled.
5. Move probe unit back from the top of the probe rods to allow work room.
6. Remove drive cap and lower extension rods into inside diameter of probe rods using couplers to join rods together.
7. Attach extension rod handle to top extension rod.
8. Rotate extension rod handle clockwise until the leading extension rod is threaded into the piston stop in downhole.
9. Continue to rotate extension rod handle clockwise until reverse-threaded stop-pin has disengaged from the drive head.

10. Remove extension rods and attached stop-pin from the probe rods.
11. Replace drive cap onto top probe rod.
12. Mark the top probe rod with a marker or tape at the appropriate distance above the ground surface (dependent on sample tube length).
13. Drive probe rods and sampler the designated distance. Be careful not to overdrive the sampler which could compact the soil sample in the tube, making it difficult to extrude.

Important: Documentation of sample location should include both surface and subsurface identifiers. Example: Correct Method - Sample Location S-6, 12.0' - 13.0'. Incorrect Method - Sample Location S-6, 12.0'.

14. Retract probe rods from the hole and recover the sample tube. Inspect the sample tube to confirm that a sample was recovered.
 15. Disassemble sampler. Remove all parts.
 16. Position extruder rack on the foot of the Geoprobe™ derrick.
 17. Insert sample tube into extruder rack with the cutting end up.
 18. Insert hammer anvil into hammer.
 19. Position the extruder piston (wood dowel) and push sample out of the tube using the PROBE control on the Geoprobe™. Collect the sample as it is extruded in an appropriate sample container.
- Caution: use care when performing this task. Apply downward pressure gradually. Use of excessive force could result in injury to operator or damage to tools. Make sure proper diameter extruder piston is used.**
20. To remove rods follow procedures outlined in Section 7.7.

7.11 Groundwater Sampling

1. Follow Sections 7.1 through 7.6 with the following exception: the Mill-Slotted Well Rod with attached threaded drive point should be the first section probed into the ground. Multiple sections of mill-slotted well rods can be used to provide a greater vertical section into which groundwater can flow.
2. Probe to a depth at which groundwater is expected.
3. Remove Drive Cap and insert an electric water-level indicator to determine if water has entered the slotted sections of probe rod. Refer to ERT SOP #2043, Water Level Measurement, to determine water level.
4. If water is not detected in the probe rods, replace the drive cap and continue probing. Stop after each additional probe length and determine if groundwater has entered the slotted rods.
5. After the probe rods have been driven into the saturated zone, sufficient time should be allowed for the water level in the probe rods to stabilize.

Note: It will be difficult if not impossible to collect a groundwater sample in aquifer material small enough to pass through the slots (<0.02 inch diameter).

6. Groundwater samples may be collected with the 20-mL well Mini-Bailer or a pumping device. If samples are being collected for volatile organic analysis (VOA), the 20-mL Well Mini-Bailer should be used. If samples are being collected for a variety of analyses, VOA samples should be collected first using the bailer. Remaining samples can be collected by pumping water to the surface. Withdrawing water with the pump is more efficient than collecting water with the 20-mL well Mini-Bailer.

Important: Documentation of sample location should include both surface and subsurface identifiers. Example: Sample Location GW-6, 17'-21' bgs, water level in

probe rods is 17 feet bgs, and the leading section of probe rod is 21 feet bgs. The water sample is from this zone, not from 17 feet bgs or 21 feet bgs.

7. Remove rods following procedures outlined in Section 7.7.

8.0 CALCULATIONS

Calculating Vapor Purge Volume for Soil-Gas Sampling without Interior Tubing

Volume of Air to be Purged (Liters) = 300 x
Number of Rods in the Ground

Volume in Liters/1000 = Reading on
Vacuum Pump Instrument Gauge

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

The following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and the REAC site specific Health and Safety Plan. The following is a list of health and safety precautions which specifically apply to Geoprobe™ operation.

1. Always put vehicle in "park", set emergency the brake, and place chocks under the tires, before engaging remote ignition.

2. If vehicle is parked on a loose or soft surface, do not fully raise rear of vehicle with probe foot, as vehicle may fall or move.
3. Always extend the probe unit out from the vehicle and deploy the foot to clear vehicle roof line before folding the probe unit out.
4. Operators should wear OSHA approved steel-toed shoes and keep feet clear of probe foot.
5. Operator should wear ANSI approved hard hats.
6. Only one person should operate the probe machine and the assemble or disassemble probe rods and accessories.
7. Never place hands on top of a rod while it is under the machine.
8. Turn off the hydraulic system while changing rods, inserting the hammer anvil, or attaching accessories.
9. Operator must stand on the control side of the probe machine, clear of the probe foot and mast, while operating controls.
10. Wear safety glasses at all times during the operation of this machine.
11. Never continue to exert downward pressure on the probe rods when the probe foot has risen six inches off the ground.
12. Never exert enough downward pressure on a probe rod so as to lift the rear tires of the vehicle off the ground.
13. Always remove the hammer anvil or other tool from the machine before folding the machine to the horizontal position.
14. The vehicle catalytic converter is hot and may present a fire hazard when operating over dry grass or combustibles.
15. Geoprobe™ operators must wear ear protection. OSHA approved ear protection for sound levels exceeding 85 dba is recommended.
16. Locations of buried or underground utilities and services must be known before starting to drill or probe.
17. Shut down the hydraulic system and stop the vehicle engine before attempting to clean or service the equipment.
18. Exercise extreme caution when using extruder pistons (wooden dowels) to extrude soil from sample tubes. Soil in the sample tube may be compacted to the point that the extruder piston will break or shatter before it will push the sample out.
19. A dry chemical fire extinguisher (Type ABC) should be kept with the vehicle at all times.

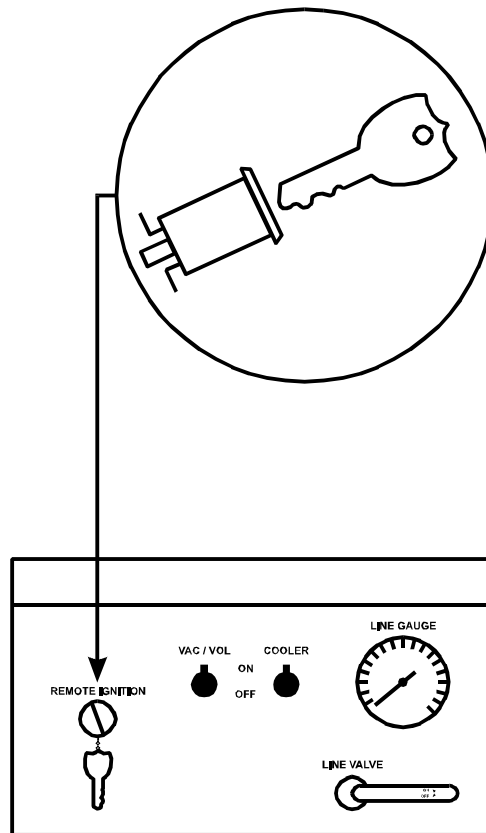
12.0 REFERENCES

1. Model 5400 Geoprobe™ Operations Manual. Geoprobe™ Systems, Salina, Kansas. July 27, 1990.
2. Geoprobe™ Systems - 1995-96 Tools and Equipment Catalog.

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Figures

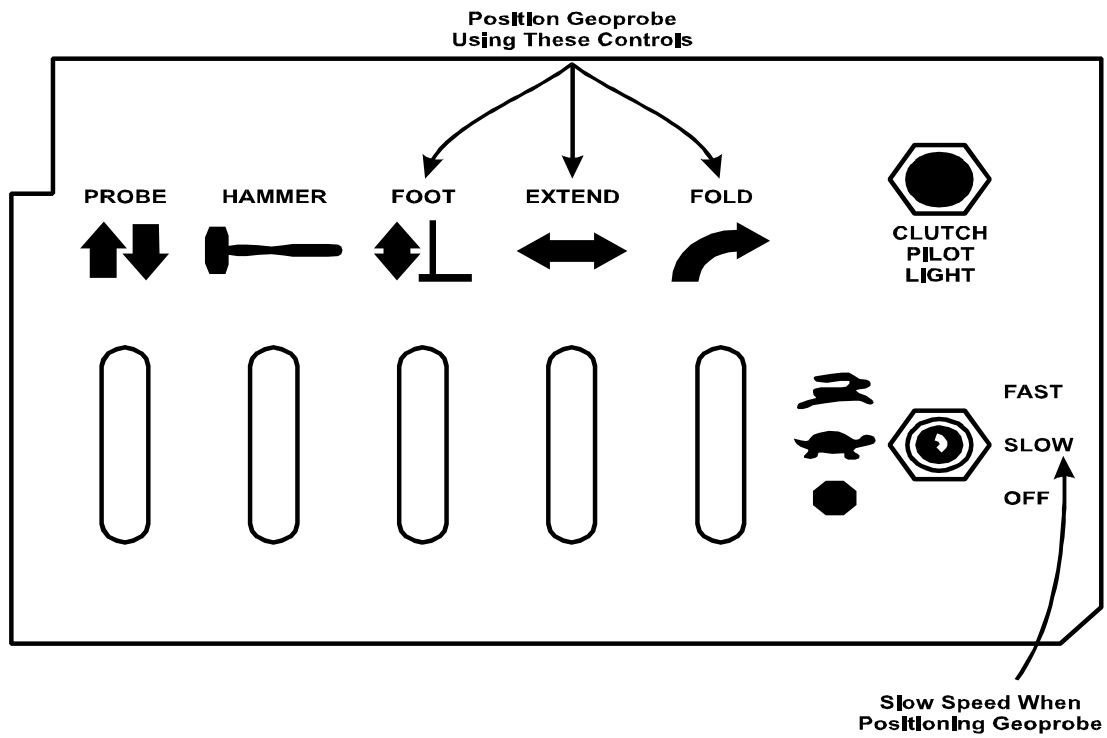
FIGURE 1. Electrical Control Panel



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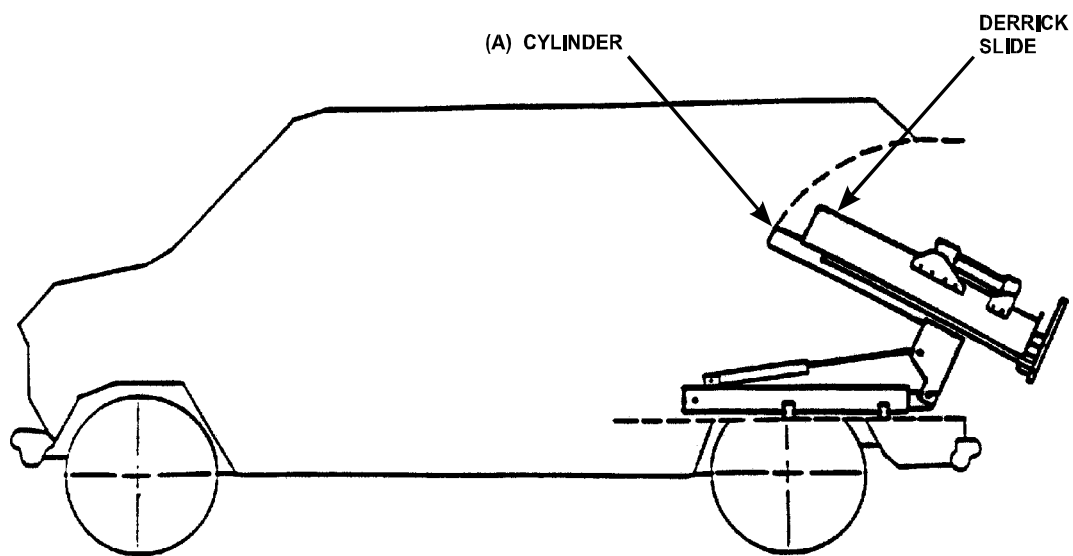
FIGURE 2. Hydraulic Control Panel



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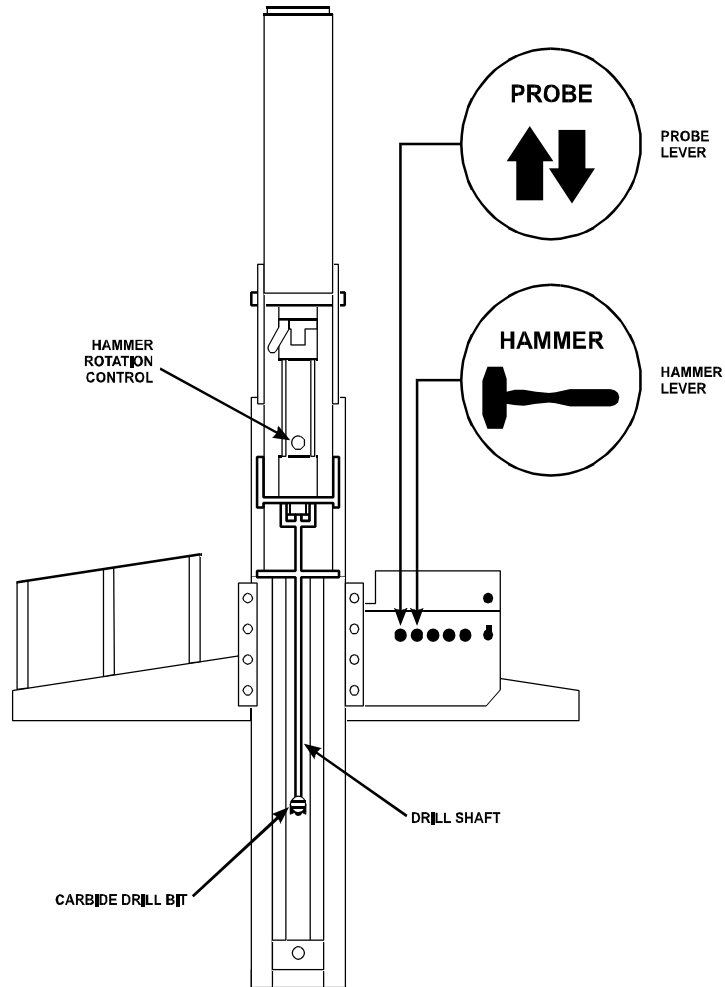
FIGURE 3. Deployment of Geoprobe™ from Sampling Vehicle



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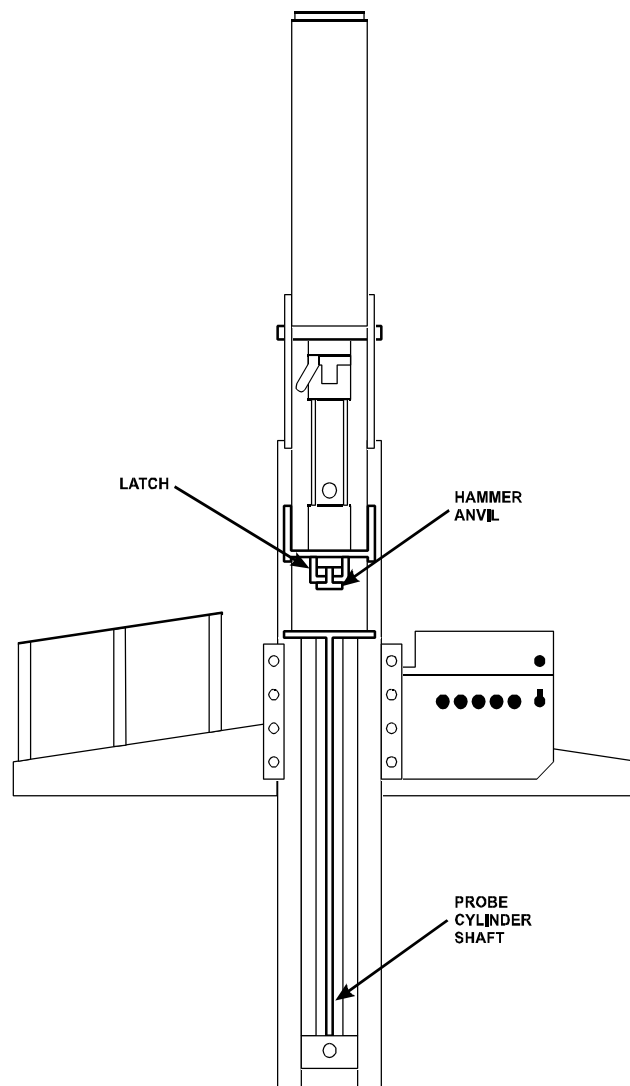
FIGURE 4. Geoprobe™ Setup for Drilling Through Concrete and Pavement



APPENDIX A (Cont'd)

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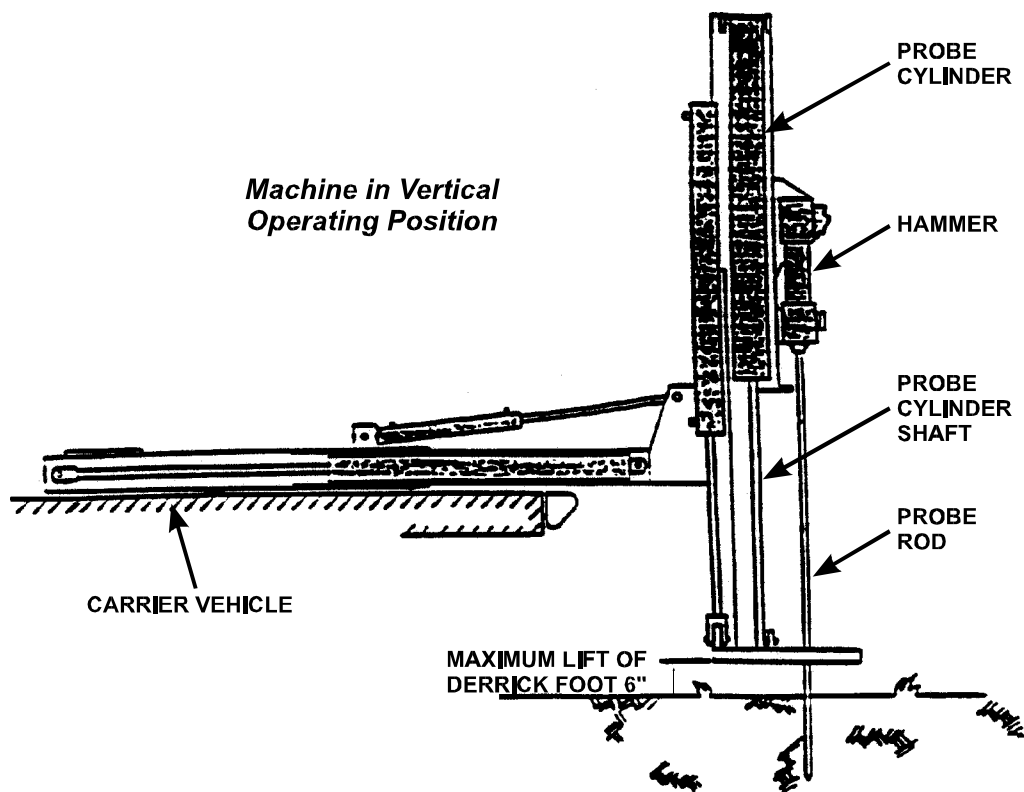
FIGURE 5. Inserting Hammer Anvil



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FIGURE 6. Probe Cylinder Shaft and Probe Rod - Parallel and Vertical



APPENDIX F:

**EPA SUPERFUND
DOCUMENT 540-R-07-06
(CLP GUIDANCE FOR
FIELD SAMPLERS)**



OSWER 9240.0-44
EPA 540-R-07-06

FINAL July 2007

Office of Superfund Remediation and Technology Innovation



Sampler's Guide



Contract Laboratory Program Guidance for Field Samplers

Disclaimer: The final version of the document replaces any prior versions of the document in their entirety.

Foreword

The intent of the Contract Laboratory Program (CLP) Guidance for Field Samplers is to replace the CLP Samplers Guide. This guidance document is designed to provide users with general information regarding environmental sample collection for the United States Environmental Protection Agency's (USEPA) Contract Laboratory Program (CLP). This document provides minimum CLP requirements, an explanation of the general sampling process sequence of events, and any related information. The appendices contain useful reference information and checklists to aid in planning and documenting sampling activities.

CLP users also are encouraged to review the Introduction to the Contract Laboratory Program document that contains a general overview of the CLP, how it works, and how to access the program. The CLP requires samplers to use the functionality provided by the Field Operations Records Management System (FORMS) II Lite™ software, which is the preferred means of creating CLP sample documentation. For guidance in using the software to record and submit sampling data, users should reference the FORMS II Lite User's Guide.

Both the Introduction to the Contract Laboratory Program and the Contract Laboratory Program Guidance for Field Samplers can be downloaded from the CLP Web site at the following address:

<http://www.epa.gov/superfund/programs/clp/guidance.htm>

The FORMS II Lite User's Guide can be downloaded from the CLP Web site at the following address:

<http://dyncsdao1.fedcsc.com/itg/forms2lite/doc.html>

For more information regarding the CLP or this guide, please contact Elizabeth Holman via email at Holman.Elizabeth@epa.gov or via telephone at (703) 603-8761.

Key Information

Text in [blue](#) and underlined indicates an external link to information outside of this document.

The images below are located throughout the document to draw attention to important information and each are labeled accordingly:



Important



Note

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List of Acronyms

| | |
|--------------------------|---|
| ASB | Analytical Services Branch |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CLP | Contract Laboratory Program |
| CLP PO | CLP Project Officer |
| CRQL | Contract Required Quantitation Limit |
| CVAA | Cold Vapor Atomic Absorption |
| DOT | Department of Transportation |
| DQO | Data Quality Objective |
| dbf | Database File |
| ET | Eastern Time |
| FORMS II Lite™ | Field Operations Records Management System II Lite |
| FSP | Field Sampling Plan |
| HCN | Hydrocyanic acid |
| IATA | International Air Transport Association |
| ICP-AES | Inductively Coupled Plasma-Atomic Emission Spectroscopy |
| ICP-MS | Inductively Coupled Plasma-Mass Spectrometry |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| NAHSO₄ | Sodium Bisulfate |
| NPL | National Priorities List |
| OSC | On-scene/on-site Coordinator |
| OSHA | Occupational Safety and Health Administration |
| OSRTI | Office of Superfund Remediation and Technology Innovation |
| OSWER | Office of Solid Waste and Emergency Response |
| PCBs | Polychlorinated Biphenyls |
| PE | Performance Evaluation |
| PM | Program Manager |
| ppb | Parts-Per-Billion |
| ppt | Parts-Per-Trillion |
| PRP | Potentially Responsible Party |
| PT | Proficiency Testing |
| PTFE | Polytetrafluoroethylene |
| PVC | Polyvinyl Chloride |
| QA | Quality Assurance |
| QAPP | Quality Assurance Project Plan |
| QASPER | Quality Assurance Sampling Plan for Environmental Response |
| QATS | Quality Assurance Technical Support |
| QC | Quality Control |
| RAS | Routine Analytical Services |
| RPM | Remedial Project Manager |
| RSCC | Regional Sample Control Center Coordinator |
| RSM | Regional Site Manager |
| SAM | Site Assessment Manager |
| SAP | Sampling Analysis Plan |
| SARA | Superfund Amendments and Reauthorization Act |
| SDG | Sample Delivery Group |
| SMC | System Monitoring Compound |
| SMO | Sample Management Office |
| SOP | Standard Operating Procedure |
| SOW | Statement of Work |
| SVOA | Semivolatile Organic Analyte |
| TR/COC | Traffic Report/Chain of Custody |
| txt | Text File |
| UN | United Nations |
| USEPA | United States Environmental Protection Agency |
| VOA | Volatile Organic Analyte |
| XML | eXtensible Markup Language |

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1.0 INTRODUCTION

1.1 About this Guide

This document describes the important organizational roles and responsibilities for those who plan and conduct environmental sample collection projects for analysis through the Superfund's Contract Laboratory Program (CLP). This chapter introduces the structure and purpose of this document. Chapter 2, *Pre-field Activities*, addresses pre-field planning activities that the sampling team could complete prior to the actual sampling event. Chapter 3, *In-field Activities*, addresses those activities that need to be completed during the sampling event.

Appendix A describes the functions within a sampling project which are taken from the Quality Assurance Project Plan requirements. Appendix B and Appendix C contain the sample collection guidelines for Volatile Organic Analytes (VOAs) in soil and in water. Appendix D recommends sampling techniques. Appendix E contains checklists to help the sampler ensure that all necessary steps are completed.



A project and site-specific Quality Assurance Project Plan (QAPP) providing Regional guidance will override guidance given within this document.

1.2 Overview of the CLP

The CLP is a national program of commercial laboratories under contract to support the USEPA's nationwide effort to clean up designated hazardous waste sites by supporting its Superfund program. The Superfund program was originally established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and presently exists under the Superfund Amendments and Reauthorization Act (SARA) of 1986.

The CLP uses state-of-the-art technology to provide users with analytical services. The program provides data of known and documented quality to support USEPA enforcement activities or other user needs. To achieve this goal, the CLP has established strict Quality Control (QC) procedures and detailed documentation requirements. Current CLP users include the USEPA Regions, States and Tribal governments, and other Federal agencies. CLP users also are encouraged to review the *Introduction to the Contract Laboratory Program* document that contains a general overview of the CLP, how it works, and how to access the program.

1.2.1 Key Players Within the CLP

In coordinating Superfund sampling efforts, the Analytical Services Branch (ASB) is supported by the Sample Management Office (SMO) contractor, the Regional CLP Project Officers (CLP POs), the Regional Sample Control Center Coordinators (RSCCs), and the Regional Site Managers (RSMs), including Site Assessment Managers (SAMs), On-scene/On-site Coordinators (OSCs), and Remedial Project Managers (RPMs). Samplers may work directly with the RSCC and/or RSM (or equivalent), and/or an OSC from the Field Support Section during a sampling event. See Table 1-1 for a brief description of the functions performed by key participants (functions may vary by Region).

Table 1-1. Participants in the CLP Sampling Process

| Participants | Responsibilities |
|---|--|
| Analytical Services Branch | <p>USEPA ASB directs the CLP from within the Office of Superfund Remediation and Technology Innovation (OSRTI) in the Office of Solid Waste and Emergency Response (OSWER). ASB responsibilities include:</p> <ul style="list-style-type: none"> • Development of the Statements of Work (SOWs) that define required analytical methods (including QC, detection/quantitation limits, and holding times) for the analytical services procured under the CLP; • Development and implementation of policies and budgets for Superfund analytical operations; • Development of information management policies and products for analytical data; • Management of SMO and Quality Assurance Technical Support (QATS) contracts; • National administration, evaluation, and management of the CLP; and • Direction of CLP Quality Assurance (QA) activities in coordination with overall OSWER QA activities. <p>To obtain the most current ASB contact list, refer to the following Web site: http://www.epa.gov/superfund/programs/clp/contacts.htm#ASB</p> |
| CLP Sample Management Office | The contractor-operated SMO provides necessary management, operations, and administrative support to the CLP. SMO receives Regional analytical requests, coordinates and schedules sample analyses, and tracks sample shipments. SMO also receives and checks data for completeness and compliance, processes laboratory invoices, and maintains a repository of sampling records and program data. |
| CLP Contract Laboratories | The contractor-operated laboratories within CLP provide necessary analytical services for the isolation, detection, and quantitation of the CLP's target compounds and analytes. |
| Regional CLP Project Officer | <p>The CLP PO monitors the technical performance of the contract laboratories in each Region. The CLP PO works closely with ASB Program Managers (PMs) to identify and resolve laboratory technical issues, and leads laboratory on-site evaluations. To obtain the most current CLP PO contact list, refer to the following Web site:</p> <p>http://www.epa.gov/superfund/programs/clp/polist.htm</p> |
| Regional Sample Control Center Coordinator | <p>In most Regions, the RSCC coordinates sampling efforts and serves as the central point-of-contact for sampling questions and problems. The RSCC works with SMO to schedule sample shipments to laboratories. In addition, the RSCC's activities may include: informing SMO of sample shipment, cancellations, special instructions, and sampling issues. To obtain the most current RSCC contact list, refer to the following Web site:</p> <p>http://www.epa.gov/superfund/programs/clp/rscclist.htm</p> |
| Regional Site Manager | The RSM Coordinates the development of acceptance or performance criteria and oversees project-specific contractors, state officials, or private parties conducting site sampling efforts. The RSM could be the SAM, the OSC, or the Remedial Project Manager (RPM). |
| Field Support Section | The Field Support Section consists of personnel such as the OSC, SAM, and RPM. In most Regions, the Field Support Section develops Standard Operating Procedures (SOPs) for field sampling and related procedures, and assists sampling teams in following those SOPs. The sampling team determines what type(s) of CLP services will be required for a particular sampling event. The Field Support Section reviews Sampling Analysis Plans (SAPs) prepared by sampling teams and oversees sampling teams in the field. The Field Support Section may also prepare their own SAPs, perform sampling activities in the field, and analyze and report the results of their sampling events to the RSM. |

1.3 Overview of the Sampling Process

Once USEPA has determined that physical, chemical, and/or biological testing of a site is necessary, samples of material from the site area must be collected. The type of material that must be collected and the analytical method to be used depends upon the physical location of the site, detection level(s), site history (previous sampling), and known or unknown conditions and contaminants. The sampling process includes carefully planned and consistently applied procedures that produce accurate and legally defensible data. The sampling team should consider the procedures and plans presented in this guide as minimum sampling process guidelines to maintain sample integrity and identity. Samples should be collected according to the approved project and site-specific QAPP and SAP. This document does not define specific sampling procedures because specific sampling protocols depend on individual site conditions, Regional requirements, and acceptance and performance criteria. Since Regions may have their own specific requirements for individual sampling programs, they are responsible for generating Region-specific sampling SOPs.

At-a-Glance: Overview of the Sampling Process

- ✓ Procedures must be consistent.
- ✓ Analytical data must be accurate and defensible.
- ✓ Procedures must meet minimum requirements.

1.3.1 Procedures Must be Consistent

The purpose of sampling is to collect representative portions from a suspected contaminated site. Sample collection is critical to determining the presence, type, concentration, and extent of environmental contamination by hazardous substances, thus it is a crucial part of every sampling and environmental testing effort. Sampling procedures must be consistently written and followed to mitigate risk of error and the expense of re-sampling.

Failure to follow proper sampling and shipping procedures could result in samples that are contaminated, broken, mislabeled, lost during shipping, or unusable because of a missed holding time. If procedures are inconsistently or improperly followed, any resultant analytical data may be inaccurate and may not be defensible in a court of law.



If re-sampling is needed due to improper sampling, the sampling team may incur the cost.

1.3.2 Analytical Data Must be Accurate and Defensible

The data gathered during sampling activities helps to accurately characterize contaminated waste sites so that the impact on human health and the environment can be properly evaluated. Acquiring accurate and defensible data that will be accepted in a court of law is the CLP's primary objective; therefore, the sampler must collect samples according to strict sampling procedures, plans, and guidelines. USEPA and many other Federal agencies use data resulting from analytical testing of soil/sediment/aqueous samples to:

- Determine if a site is contaminated with organic and/or inorganic compounds;
- Identify pollution sources and Potentially Responsible Parties (PRPs);
- Validate remedial design methodologies;
- Assess response and remedial priorities;
- Assess risk to human health and the environment;
- Determine appropriate cleanup actions; and
- Determine cleanup achievements.

1.3.3 Sampling Procedures and Guidelines Must Meet Minimum Requirements

It is imperative that samplers be aware of the minimum CLP and Regional requirements that directly impact and define how a sampling event will take place. It is important to note that the procedures and guidelines set forth in this document are considered minimum CLP requirements. Samplers should reference the following sections within this document that specifically address important requirements that must be met for a successful sampling event:

- Section 1.4.1 CLP Documentation Requirements;
- Section 2.4.1 Request Scheduling of Analysis, SMO-assigned Case Numbers, CLP Sample Numbers, and Laboratory Contact Information;
- Section 2.7 Comply with Transportation and Shipping Requirements;
- Section 2.8 Provide Shipment Notification;
- Section 3.1 Collect Samples; and
- Section 3.2 Complete Documentation.

1.4 Overview of Sampling Documentation Requirements

The sampler must properly document samples collected for analysis in order to uniquely identify each sample and ensure adequate chain-of-custody procedures. When collecting samples, the sampler should always keep in mind that any samples collected may be used in future litigation. This is especially important when samples are from privately owned property. If sampling on privately owned property, samplers should also provide the property owner with a receipt for samples collected and removed from that owner's property. Samplers may also be required by a Region to use a sample label, sample tag, or field operations records documenting information such as daily activities, equipment and materials used, personnel involved, site security, etc. These types of documentation help ensure proper sample identification and provide additional chain-of-custody records.

The documentation required by a Region for a sampling event is outlined in project plans such as the QAPP, SAP, and Field Sampling Plan (FSP).

At-a-Glance: Overview of the Sampling Document Requirements

- ✓ Must use FORMS II Lite to create sample documentation. Analytical data must be accurate and defensible.
- ✓ CLP documentation requirements:
 - CLP Sample Number
 - SMO-assigned Case Number
 - Traffic Report/Chain of Custody (TR/COC) Record
 - Sample Labels
 - Sample Tags
 - Custody Seals
 - Field Operation Records



Under no circumstances should the site name appear on any documentation that is sent to the laboratory (for the CLP).

1.4.1 CLP Documentation Requirements

Samplers must:

- 1) Record the CLP Sample Number on each sample bottle;
- 2) Complete the Traffic Report/Chain of Custody (TR/COC) Record using the FORMS II Lite software, making sure to indicate on the TR/COC Record if the samples require the use of a Modified Analysis;
- 3) Complete and attach sample labels;
- 4) Complete and attach sample tags to meet Regional requirements;
- 5) Complete and attach custody seals to meet Regional requirements; and
- 6) Complete field operations records, as necessary.

Please contact your RSCC (see Table 1-1) for information regarding CLP Sample Numbers, SMO-assigned Case Numbers, TR/COC Records, and chain-of-custody seals for sampling events.

For information regarding using FORMS II Lite to create and complete a TR/COC Record, refer to the following Web site:

<http://www.epa.gov/superfund/programs/clp/f2lite.htm>

1.4.1.1 CLP Sample Number

A CLP Sample Number is unique per sampling location and is used to identify and track samples throughout the sampling and analytical processes and is recorded on many types of sampling documentation (e.g., TR/COC Records, sample labels, and sample tags). CLP Sample Numbers are provided to samplers by their RSCC or SMO.

Samplers must contact their RSCC (or their designee) to obtain CLP Sample Numbers for their sampling event. Samplers must correctly assign the CLP Sample Numbers to the appropriate sample bottle or container. Please refer to Section 3.2.1 for more detailed information regarding the use of CLP Sample Numbers.



If the sampler has any questions regarding the assignment of CLP Sample Numbers, they should contact their RSCC.

1.4.1.2 SMO-assigned Case Number

SMO-assigned Case Numbers are used to track groups of samples throughout the sampling and analytical processes and are recorded on many types of sampling documentation (e.g., TR/COC Records, sample labels, and sample tags). Samplers must correctly assign the SMO-assigned Case Number to the appropriate sample bottle or container. To obtain a SMO-assigned Case Number, samplers must contact their RSCC (or their designee).

1.4.1.3 Laboratory Assignment

Samplers are responsible for shipping samples to the appropriate SMO-assigned laboratory for analysis. Samplers must contact their RSCC (or their designee) to obtain their laboratory assignment or they may be provided by SMO.

1.4.1.4 TR/COC Record

The TR/COC Record is used as physical evidence of sample custody and functions as a permanent record of each sample collected.

Per CLP documentation requirements, each cooler must contain a TR/COC Record that lists all the samples contained therein.

In an effort to automate sample documentation in the field, ASB has developed a stand-alone, Windows-based software application that samplers can use to automatically create and generate sample documentation. The FORMS II Lite software allows users to enter information prior to and during sampling events. It allows users to multi-task and electronically create, edit, and print documentation associated with sampling activities. Users can customize data entry screens throughout the entire documentation process. Users can also customize the format and content of sample labels based on specific requirements.

The program simplifies and accelerates the tedious manual sample documentation process by reducing the generation of handwritten documents by almost 70%. The FORMS II Lite software enables samplers to:

- Increment CLP Sample Numbers or manually assign their own unique, project-specific non-CLP Sample Numbers;
- Input the SMO-assigned Case Number into the appropriate field;
- Create sample labels, sample tags, TR/COC Records, Sample Weight forms, and receipts for samples taken from a site;
- Track samples from the field to the laboratory;

- Electronically capture sample information into databases; and
- Export electronic data as a database File (.dbf), Text (.txt), or eXtensible Markup Language (.xml) file.

USEPA requires samplers to use the FORMS II Lite software for all CLP sampling efforts. For assistance with obtaining or using the FORMS II Lite software, please contact the FORMS II Lite Help Desk at 703-818-4200 from 9:00 AM - 5:00 PM Eastern Time (ET). For additional information regarding FORMS II Lite use and training, please refer to the following Web site:

<http://www.epa.gov/superfund/programs/clp/f2lite.htm>

1.4.1.5 Chain-of-Custody Seals

A chain-of-custody seal is any adhesive label or tape that can be used to seal a sample bottle, container, plastic bag, or shipping cooler such that if it is opened or tampered with, the seal will be broken. Custody seals must be placed on each sample bottle, container, or bag (as appropriate) and each shipping cooler or container. The custody seal is an excellent means of maintaining a record of chain-of-custody, as well as guarding against possible sample contamination or tampering during shipping.

1.4.1.6 Sample Labels

A sample label is a sticker attached to a sample bottle or container that contains a sample. Sample labels are affixed to each sample container as samples are collected in the field or affixed prior to going in the field. A sample label must contain, at a minimum, a CLP Sample Number so that they can be associated with, and listed on, the associated TR/COC Record. The sample label may also include the required analysis/fraction and preservative used (to eliminate confusion at the laboratory). Samplers should refer to their project plans for Region-specific sample label requirements.

1.4.1.7 Sample Tags

A sample tag identifies a sample bottle or container that contains a sample. The tag also provides specific analytical direction and proof that a sample existed. To support the use of sample data in potential enforcement actions, samples with other than in situ measurements (e.g., pH, temperature, conductivity) can be identified with a sample tag. A CLP Sample Number and SMO-assigned Case Number must be recorded on a sample tag to indicate that the sample container comprises the whole sample in the case where there is just one container of sample, or part of the indicated sample in the case of multiple containers of sample. Samplers should refer to their project plans for Region-specific sample tag requirements.

1.4.1.8 Field Operation Records

Samplers should maintain complete, accurate, and legible field operations records as they perform a sampling activity. The following records are included: Field Logbooks; Corrective Action Reports; Sampling Trip Reports; supplemental standardized forms; logs; and records such as maps or photographs that document each step of the work performed in the field. Samplers should refer to their project plans for Region-specific field operations record requirements. These records are very important tools because they are considered part of the official project file when legal issues arise.

1.4.1.9 Weight Logs

A sample weight log identifies the tared, sample and final weights per bottle for VOA samples. In order to support Method 5035 for VOAs, samplers should enter tared and final weights per bottle in the CLP Sample Weight Log.

2.0 PRE-FIELD ACTIVITIES

This chapter provides instructions for completing the suggested pre-field activities that samplers could complete prior to performing sampling activities. These important pre-field activities will save time and help the sampler to better prepare for the sampling event. Samplers should be aware of issues routinely arise during the sampling process so that samplers can avoid making the same mistakes or having the same problems that could adversely affect their sampling event. Samplers are also expected to review all pertinent project plans and meet both CLP and Regional requirements that directly impact the structure and purpose of a sampling event.

The project plans provide information such as the types and numbers of samples to be collected, the analytical methods to be used based on the desired level of quantitation, and the necessary equipment and supplies. The plans also describe the sampling method which may require different specific sample volumes/masses, containers, preservation, shipping, and handling to maintain the integrity of the samples without degradation or contamination.

In addition to reviewing project plans, samplers should determine if the sampling site is privately or publicly owned and obtain the necessary permission to access the sampling site. If the site is privately owned, samplers should make sure to have receipts for available samples to provide to the owner for all samples collected and removed from their property. Samplers must also prepare to identify and obtain sampling materials, prepare to meet documentation requirements by obtaining and learning to use the required software, comply with transportation and shipping requirements, and perform a readiness review/dry run of the sampling process.

At-a-Glance: Pre-field Activities

- ✓ Prepare for and communicate during a sampling event.
- ✓ Review project plans containing Regional requirements.
- ✓ Plan to meet documentation requirements.
- ✓ Obtain any necessary permits, licenses, and clearances.
- ✓ Identify and obtain sampling materials.
- ✓ Comply with transportation and shipping requirements.
- ✓ Provide shipment notification.
- ✓ Perform Readiness Review/Run-through.

2.1 Prepare for a Sampling Event

Samplers must prepare to meet CLP and Regional requirements for a sampling event, appropriately use the CLP Sample Number and SMO-assigned Case Number, complete the TR/COC Record using the FORMS II Lite software, and complete and attach the custody seal(s). It is very important that the sampler include the correct CLP Sample Number on each sample. It is also imperative that the TR/COC Record be accurately completed and submitted with the sample(s). Finally, the sampler must accurately and legibly complete and attach a custody seal to each sample container, or plastic sample bag (as appropriate), and each shipping cooler or container.

However, meeting the sampling requirements requires more than just the proper application of a CLP Sample Number on each sample, completion of the TR/COC Record, and use of a custody seal. The actual collection of samples, packaging, and shipping of those samples are equally important to a successful sampling event.

For example, if a sampler collects an insufficient volume of a sample, the laboratory may not be able to perform the requested analysis. Insufficient sample volumes may also result in a laboratory being unable to perform laboratory quality control, such as Matrix Spike (MS), Matrix Spike Duplicate (MSD), and Duplicate sample analysis. Additionally, if the laboratory receives a sample that is either unpreserved or the sample pH is outside of the required range, the sample cannot be properly analyzed.

Unfortunately, improper shipping and labeling processes and procedures often result in:

- Samples being shipped to the wrong laboratory;
- Broken or empty samples being received at the laboratory; and
- Custody seals or sealant tape that is missing or broken on sample bottles, containers, plastic bags, or shipping coolers shipped to the laboratories.

The importance of completing the paperwork associated with a sampling event cannot be overemphasized. Samplers must make a conscientious effort to accurately complete the TR/COC Record since this is the main document used to derive vital information about a particular sample. The person completing a TR/COC Record

must be careful to avoid errors such as the appropriate sample(s) not being listed, or the wrong samples being listed. In an effort to eliminate such errors and the confusion that can be associated with handwritten TR/COC Records, samplers must use the FORMS II Lite software to complete the TR/COC Record and other associated sampling documentation.

It is extremely important that QC samples, including field sample duplicates, field samples for Matrix Spike and Matrix Spike Duplicate analyses, and Proficiency Testing (PT) samples, also known as Performance Evaluation (PE) samples, be designated and labeled per Regional guidance by samplers in the field. Mislabeling of QC samples can result in improper and/or inaccurate analysis of a sample at the laboratory.

2.2 Communicate During a Sampling Event

Communication is a key element in planning, administering, and conducting a sampling event. It is extremely important that all parties involved in a sampling event be in contact throughout the sampling process. The procedures and recommendations outlined in this guide are based on more than 20 years of experience. It has been demonstrated that approximately 50% of all sampling efforts have been negatively affected by incorrect sampling procedures and poor communication among participants.

The key elements of communication for a sampling event include the relationship between the RSCC, SMO, the samplers in the field, and the laboratories who will be accepting the samples. For instance, the samplers must contact the RSCC to start the process for setting up a sampling event. The RSCC will in turn contact SMO who will schedule the sampling event, establish laboratory availability, and arrange for the laboratory to accept projected samples. SMO will then communicate the laboratory assignment to the Region and possibly the sampler.



The sampler should contact the RSCC (per Regional guidelines) and allow enough time for the RSCC to contact SMO at least a week prior to the sampling event.

SMO provides SMO-assigned Case and CLP Sample Numbers in time for the sampling event. SMO also schedules a laboratory and makes sure the laboratory will not have any capacity problems. Communication is also important because if there is a change in the sampling event due to a cancellation or an increase or decrease in the number of samples that will be sent to the laboratory, the sampler can contact the RSCC who can work with SMO to remedy potential capacity, availability, or overbooking problems.

2.3 Review Project Plans Containing Regional Requirements

In addition to meeting CLP requirements, the sample collection process must fulfill numerous Regional requirements. These requirements are determined by a variety of factors that affect how samples should be collected for an individual sampling event. These factors include:

- The type of samples being collected (organic/inorganic, water, soil/sediment, etc.);
- The method by which the samples will be analyzed;
- The acceptance or performance criteria (i.e., Data Quality Objectives [DQOs]); and
- The type of data needed.

The QAPP for each sampling project is written to meet requirements outlined in the documents *EPA Requirements for Quality Assurance Project Plans* (QA/R-5), *EPA Guidance on Quality Assurance Project Plans* (G-5), and Regional QAPP preparation documents. The QAPP is prepared in advance of field activities and is used by samplers to develop any subsequent plans such as the Sampling SAP or the FSP. Samplers should review the QAPP and any subsequent project plans for information outlining the basic components of a sampling activity. QAPP and project plans should be finalized and approved by appropriate Regional QA personnel, the OSC, SAM, or the RPM before providing them to the sampling team. This should be done prior to the start of field activities. Appendix A explains the functions within a sampling project (as these functions relate to a sampling event) and the elements of that function as described in a typical QAPP. Copies of all project plans and relevant SOPs should be maintained in the field for the duration of the sampling project.

2.4 Plan to Meet Documentation Requirements

Sampling events require a variety of accurate and complete documentation. Samplers should review their project plans to determine the types of documentation that must be completed for a sampling project and to ensure that the appropriate documentation will be on-hand in the field. The CLP documentation requirements include the CLP Sample Number, the SMO-assigned Case Number, the TR/COC Record, sample labels, sample tags, custody seals, and field operations records (as necessary). Samplers need to request SMO-assigned Case and CLP Sample Numbers for each sampling event prior to starting field activities. Samplers also need to make sure that the correct TR/COC Records (Organic TR/COC Record for organic analysis or Inorganic TR/COC Record for inorganic analysis) are being used within the FORMS II Lite software. Finally, samplers should be prepared to complete the appropriate shipping cooler return documentation.

At-a-Glance:

Plan to meet documentation requirements.

- ✓ Request SMO-assigned Case and CLP Sample Numbers.
- ✓ Prepare sample cooler return documentation.
- ✓ Prepare to use the FORMS II Lite software.

Since samplers are required to use the FORMS II Lite software to prepare and submit sampling project documentation and maintain sample chain-of-custody, software users must be familiar with all emergency back up procedures that should be followed in the event of a system failure. Samplers must have access to FORMS II Lite-generated TR/COC Records at sampling events. If problems are experienced while using the FORMS II Lite software, please contact the FORMS II Lite Help Desk at 703-818-4200 from 9:00 AM - 5:00 PM ET.

In the event of a system crash, samplers must have backup hardcopies of FORMS II Lite TR/COC Records. For information regarding emergency backup procedures, please refer to the following Web site:

<http://www.epa.gov/superfund/programs/clp/trcoc.htm>

2.4.1 Request Scheduling of Analysis, SMO-assigned Case Numbers, CLP Sample Numbers, and Laboratory Contact Information

SMO-assigned Case Numbers are assigned based on a request for CLP Routine Analytical Services (RAS), which is processed through the RSCC (or his/her designee). The sampler must request the RSCC to schedule CLP RAS analysis. The CLP does have the capacity to schedule sampling on an emergency basis, however the sampler must contact the RSCC (or his/her designee) to obtain details regarding how to handle such a situation. When scheduling a sampling event that will last for more than one week, it is recommended that the sampler contact the RSCC (or his/her designee) on a weekly basis to provide updates. This contact between the sampler, the RSCC (or his/her designee), and SMO is very important because it will ensure better availability of laboratory capacity.

In addition to SMO-assigned Case and CLP Sample Numbers, samplers should make sure to have accurate laboratory contact information, such as:

- Laboratory name;
- Laboratory address;
- Contact name; and
- Laboratory phone number.

This information is used for both TR/COC Records and chain-of-custody documentation and shipping paperwork such as address labels and airbills.

The SMO-assigned Case Number is used to track groups of samples throughout the sampling and analytical processes. Samplers must correctly indicate the assigned Case Number on the appropriate sample bottle or container.



The RSCC (or his/her designee) provides the CLP Case Numbers and Sample Numbers for each sampling event to samplers. Once the CLP Sample Numbers have been provided to the sampler, the sampler can use FORMS II Lite to print them onto sample labels.

The following characters are not to be used in generating CLP Sample Numbers and should never appear on any paperwork submitted to the laboratory: I, O, U, and V.

A CLP *Sample Number* is defined as a number that is unique per sampling location and identifies each CLP sample (see Section 1.4.1.1). Since samples must be identified per analytical program (either organic or inorganic), there are two types of TR/COC Records and two letter codes to denote organic vs. inorganic analysis.

A CLP *sample* is defined as one discrete portion of material to be analyzed that is contained at one concentration level, from one station location for each individual or set of analytical fractions -- provided the fractions are all requested for the same CLP analytical service (i.e., organic or inorganic), and identified by a unique Sample Number.



When samples are collected from several station locations to form a composite sample, the composite sample should be assigned either a number from one of the station locations used during collection, or a unique number that represents the composite sample for tracking purposes. The numbering scheme used internally at a sampling event for identifying composite samples should also be documented appropriately (e.g., in the field logs).

Organic CLP Sample Numbers begin with the Regional letter code, followed by four letters and/or numbers. Inorganic CLP Sample Numbers begin with “M”, followed by the Regional letter code and then four letters and/or numbers. See Table 2-1 for Region and letter codes for each sample type (i.e., organic or inorganic).

Table 2-1. CLP Sample Number Letter Codes

| Region | Letter Code | |
|--------|-------------|-----------|
| | Organic | Inorganic |
| 1 | A | MA |
| 2 | B | MB |
| 3 | C | MC |
| 4 | D | MD |
| 5 | E | ME |
| 6 | F | MF |
| 7 | G | MG |
| 8 | H | MH |
| 9 | Y | MY |
| 10 | J | MJ |

According to CLP guidelines, each individual inorganic water sample may be analyzed for total metals or dissolved metals, but not both. Therefore, water samples collected for total metal and dissolved metal analyses from the same sampling location must be assigned separate (unique) CLP Sample Numbers. A sampler can use the same CLP Sample Number for an inorganic soil or water sample collected for total metals, mercury and cyanide analyses.

Organic soil and water samples may be collected for analysis under the SOM01 SOW to detect:

- Aroclors;
- Semivolatile Organic Analytes (SVOAs);
- Pesticides;
- Volatile Organic Analytes (VOAs); and/or
- Trace Volatile Analytes

Inorganic soil and water samples may be collected for analysis for cyanide, and for metals using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES) and Cold Vapor Atomic Absorption (CVAA), under the ILM05.X SOW.

Inorganic water only samples may be collected for analysis for cyanide, and for metals using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) and CVAA, under the ILM05 SOW.

2.4.2 Prepare Sample Cooler Return Documentation

CLP laboratories must routinely return sample shipping coolers to the appropriate sampling office within 14 calendar days following receipt of shipment from the sampler. For sample coolers to be returned, the

sampler must complete the appropriate cooler documentation and work with Regions and government agencies to provide a cost-effective mechanism for laboratories to return the empty coolers to the appropriate sampling office. The sampling cooler return documentation can be prepared in advance and provided to samplers before field activities begin. **The sampler (not the CLP laboratory) is responsible for paying for return of the cooler and should also include shipping airbills bearing the sampler's account number, as well as a return address to allow for cooler return.**

To maintain consistency among cooler transportation programs, samplers should:

- Minimize the use of multiple transportation carriers to avoid confusion;
- Use multiple-copy labels so the laboratory and the sampling team can each retain a copy for their records;
- Prepare labels in advance so that the laboratory can simply affix a completed shipping label on the cooler;
- Include third-party billing information (i.e., their shipping account number) on labels so the laboratory will not be billed by the transportation carrier;
- Confirm that the laboratory knows which transportation carrier to use; and
- Include the SMO-assigned Case Number on return information.

2.5 Obtain Municipal Permits, Licenses, and Clearances

Before starting a sampling event, samplers must make sure to obtain the proper municipal permits, accesses to the property, and any government clearances, if required. The sampler must also contact any appropriate utility companies to ascertain where any underground pipes, cables, etc., may be located.

At-a-Glance:

Obtain permits, licenses, and clearances.

- ✓ Request access to County, State, Tribal, military, and/or Federal property.
- ✓ Contact private property owner(s).
- ✓ Contact utility companies.

2.5.1 Request Access to County, State, Tribal, Military, and/or Federal Property

Proper access to perform sampling activities is important not only for legal reasons, but also to eliminate delays in work and possible refusal to allow sampling to take place. It is crucial that the appropriate permits, licenses, and clearances be secured to obtain access for sampling activities that will be performed on County, State, Tribal, military, and/or Federal property. The sampler must contact the appropriate government offices or personnel well in advance to determine what kinds of approval are required. Pre-approval may be required for specific types of sample collection such as drilling or excavation. For example, drilling on a military base requires pre-approval. Base security may require clearances for all members of the sampling team, including subcontractors. This process may take two or more days.

If arrangements are not made in advance, the team may not be allowed to enter the site until their clearances are processed and the team has been approved to drill. As a result, the sampling schedule is delayed, costing extra time and money.

2.5.2 Contact Private Property Owners

The sampler must obtain written permission from the private property owner(s) before sampling on their property, even if verbal permission has been granted. It is recommended that samplers obtain verbal permission prior to their arrival at the sampling location, but written permission can be obtained on the day of sampling. If a property owner refuses to grant access to their property, it may be necessary for sampling participants to contact the appropriate authorities for assistance.

2.5.3 Contact Utility Companies

The sampler should contact local utility companies (e.g., power, phone, gas, cable, sanitation, etc.) at least one week prior to the sampling event to have underground cables, lines, and pipes flagged and marked. This is required by law. A national one-call directory can be found at:

<http://www.digsafely.com/contacts.htm>.

This will eliminate potential safety hazards and service disruption. For example, soil sampling in a residential area may require digging below the soil's surface. It is very important to know where utility lines and pipes are located so that samplers do not hit live electrical wires or rupture gas lines. Samplers should follow Regional or other appropriate program procedures for the procurement of such services. The utility service(s) disruption dates should be confirmed at least two days prior to sampling activities.



Pre-payment of survey fees to local utility companies may be required.

2.6 Identify and Obtain Sampling Materials

Samplers must make sure to be prepared for a sampling project with the appropriate sampling materials (equipment, supplies, sample containers, packing materials, and shipping materials). The equipment and supplies must be properly cleaned, calibrated, and tested as necessary to meet the needs of the sampling project.

At-a-Glance:

Identify and obtain sampling materials.

- ✓ Procure appropriate equipment and supplies.
- ✓ Procure sample containers.
- ✓ Procure shipping supplies.

2.6.1 Procure Appropriate Equipment and Supplies

Each sampling event requires the procurement of equipment and materials to collect, document, identify, pack, and ship samples. The proper field sampling equipment is vital to a successful sample collection. Regional or other samplers should obtain, and arrange in advance, all of the equipment and supplies required for each sampling event. Samplers should review the project plans to verify that the proper equipment is being used for sample collection.

At a minimum, the following materials are generally required during a sampling event:

- Sample storage containers;
- Packing material;
- Sample containers;
- Shipping containers;
- Access to the FORMS II Lite software for creating sample labels, stickers, tags, and TR/COC Records;
- Custody seals; and
- Sampling equipment such as bowls, augers, pumps, etc.

Sampling events may also require specific items such as:

- Cooler temperature blanks;
- Trip blanks for VOA analysis;
- Preservation supplies (e.g., ice or acid); and
- Specially prepared sample vials (e.g., for SW-846 Method 5035A).

2.6.2 Procure Sample Containers

The analytical protocol(s) to be used for sample analysis often requires the use of a particular type of sample container. The type of container also may depend on the sample matrix and analysis. It is recommended that samplers use borosilicate glass containers, which are inert to most materials, when sampling for pesticides and/or other organics. Conventional polyethylene is recommended when sampling for metals because of the lower cost and absorption rate of metal ions.

Using the wrong container may result in breakage, gathering of an insufficient volume needed to perform sample analysis, or the container material may interfere with the analysis. Therefore, samplers should identify and use the correct sample containers for each sampling event.

Containers procured for a sampling event are usually pre-cleaned and shipped ready-for-use from the manufacturer to the sampling site. Regardless of the type of container used, samplers must ensure that the containers have been analyzed or certified clean to levels below concern for the project. These containers must meet the USEPA container type specifications listed in Table 2-2.

Table 2-2. Container Type Specifications

| Reference Number | Container Type | Specifications | |
|------------------|---|--|--|
| | | Closure | Septum |
| 1 | 40 mL amber glass vial, 24 mm neck finish. | Polypropylene or phenolic, open-top screw-cap, 15 cm opening, 24-400 size. | 24 mm disc of 0.005 in. Polytetrafluoroethylene (PTFE) bonded to 0.120 in. silicone for total a thickness of 0.125 in. |
| 2 | 1 L high density polyethylene, cylinder-round bottle, 28 mm neck finish. | Polyethylene cap, ribbed, 28-410 size; F217 polyethylene liner. | N/A |
| 3 | 8 oz short, wide mouth, straight-sided, glass jar, 70 mm neck finish. | Polypropylene or phenolic cap, 70-400 size; 0.015 in. PTFE liner. | N/A |
| 4 | 4 oz (120 mL) tall, wide mouth, straight-sided, glass jar, 48 mm neck finish. | Polypropylene or phenolic cap, 48-400 size; 0.015 in. PTFE liner. | N/A |
| 5 | 1 L amber round glass bottle, 33 mm pour-out neck finish. | Polypropylene or phenolic cap, 33-430 size; 0.015 in. PTFE liner. | N/A |
| 6 | 500 mL high density polyethylene, cylinder-round bottle, 28 mm neck finish. | Polypropylene cap, ribbed, 28-410 size; F217 polyethylene liner. | N/A |
| 7 | Coring tool used as a transport device (e.g., 5 g Sampler). | Has built-in closing mechanism. | N/A |
| 8 | 250 mL high density polyethylene, cylinder-round bottle, 28 mm neck finish. | | N/A |

The information contained in this table is also cross-referenced in the sample collection parameters discussed in Chapter 3. The container Reference Numbers are used in Tables 3-2 and 3-3 under the Containers column. For example, samples collected for low-level soil VOA analysis using SW-846 Method 5035A may require the sampler to use pre-prepared, tared closed-system purge-and-trap vials with a preservative (refer to Appendix B).



Have extra containers readily available for each sampling event in case of breakage, loss, or contamination.

2.6.3 Procure Shipping Supplies

Samples should be correctly packaged into the appropriate shipping containers to reduce the risk of breakage or leakage, and the shipping containers should be appropriately prepared for shipment. Before heading into the field, samplers should refer to the appropriate project plans to determine the types of samples that will be taken during the sampling project so that samplers will have the proper packaging materials at the site for all pertinent samples container types and sample matrices. Samplers should also make sure to obtain the appropriate shipping paperwork (e.g., shipping forms required by the delivery service).

2.7 Comply with Transportation and Shipping Requirements

Samplers are expected to review the applicable project plans to be aware of all State, Federal, Department of Transportation (DOT), and International Air Transport Association (IATA) regulations governing environmental and hazardous sample packaging. The person who ships the samples is responsible for being in compliance with applicable packaging, labeling, and shipping requirements.



Samplers should request and receive sample permits for outside the continental United States, prior to shipping.

Additional information can be obtained on Hazardous Materials Safety Program regulations from the DOT's Research and Special Programs Administration. Federal transportation regulations can be found in 49-CFR Parts 100-185, are available on the Internet at:

<http://www.myregs.com/dotrspa/>

2.8 Provide Shipment Notification

Some Regions may require that samplers notify their RSCC (or his/her designee) when samples are shipped. Some Regions allow samplers to contact SMO directly to provide shipment notification. It is recommended that samplers contact the RSCC of sample origin to verify if such notification is necessary. If samplers are shipping samples after 5:00 PM ET, samplers must notify the RSCC (or designee) or SMO by 8:00 AM ET on the following business day.



For Saturday delivery at the laboratory, samplers **MUST** contact the RSCC (or designee) or SMO so that SMO will receive the delivery information by 3:00 PM ET on the Friday prior to delivery.

2.9 Perform Readiness Review/Dry Run

A readiness review/dry run is a test run of the proposed sampling event. This is a recommended practice since it gives samplers a chance to check all plans, documentation software (i.e., FORMS II Lite), and equipment lists for accuracy and completeness prior to sampling activities. It also provides an opportunity to consult with sampling team members to make sure all the elements are in place and everyone understands their tasking before actually going out to the field. Sampling project managers should provide the test or dry run dates and schedules to samplers so that samplers can prepare accordingly.

3.0 IN-FIELD ACTIVITIES

This chapter addresses the in-field activities a sampler will focus on during a sampling event such as: determining the type of samples to be collected; collecting the samples; meeting volume, preservation, and holding time requirements; completing documentation; and packing and shipping samples.

When performing a sampling event, the sampler is expected to follow prescribed sampling techniques. The sampler should also be aware of any special sampling considerations, contamination issues, and sample compositing and mixing methods that could affect their sampling efforts. Please refer to Appendix D for more detailed information.

At-a-Glance: In-field Activities

- ✓ Collecting samples
- ✓ Completing documentation
- ✓ Sampling considerations
- ✓ Procuring shipping supplies



Appropriate Regional guidance and procedures should be consulted for detailed sample collection, preservation, handling and storing, equipment decontamination, and QA/QC procedures.

3.1 Collect Samples

CLP RAS are generally used to analyze samples from Superfund sites. The matrices can be water, soil, or sediment. In some instances, a mixed-matrix sample may be collected which contains either a supernate (for a sediment/soil sample) or a precipitate (for a water sample). In this event, samplers should consult their management plans and/or discuss the required procedures with the RSM or their designee.

A CLP sample consists of all sample aliquots (portions):

- for each individual or set of analytical fractions;
- from one station location;
- for one sample matrix;
- at one concentration level;
- for one laboratory; and
- for one analytical program;

provided that the fractions are all requested from the same CLP analytical service.

In general, it is recommended that two individual samples be collected by separating the aqueous layer from the solid/precipitate layer at the point of collection. They may be assigned two different sample IDs (e.g., Sample IDs ABC124 and ABC125 for Sample ID ABC123), along with a note in the field sample log or tracking system that the sample IDs are derived or related to the same sample ID, to ensure correct follow-up upon receipt of results from the laboratory. Alternatively, they may be assigned the same sample ID, along with a notation of each individual sub-sample or fraction (e.g., Sample IDs ABC123-1 and ABC123-2 or Sample ID ABC123 Fraction 1 and Sample ID ABC123 Fraction 2 for Sample ID ABC123).

3.1.1 Determine Types of Samples to be Collected

Samplers may be required to take several types of samples or sample aliquots during a sampling event. They should refer to their project plans to determine the types of samples or aliquots to be taken, the volumes needed of each sample or aliquot, and the preservation needed for each sample. For an explanation of the various sample types and the requirements for collecting and submitting each particular type, refer to Table 3-1.

Table 3-1. QC Sample Types and CLP Submission Requirements

| Sample Type | Purpose | Collection ¹ | CLP Sample Number |
|--|---|---|---|
| Field Duplicate | To check reproducibility of laboratory and field procedures. To indicate non-homogeneity. | Collect from areas that are known or suspected to be contaminated. Collect one sample per week or 10% (Regions may vary) of all field samples per matrix, whichever is greater. | Assign two separate (unique) CLP Sample Numbers (i.e., one number to the field sample and one to the duplicate). Submit blind to the laboratory. |
| Field Blanks | To check cross-contamination during sample collection, preservation, and shipment, as well as in the laboratory. Also to check sample containers and preservatives. | Collect for each group of samples of similar matrix per day of sampling. Organics - Use water (demonstrated to be free of the contaminants of concern). Inorganics - Use metal-free (deionized or distilled) water. | Assign separate CLP Sample Numbers to the field blanks. |
| Trip Blank (Volatile Organic Analysis Only) | To check contamination of VOA samples during handling, storage, and shipment from field to laboratory. | Prior to going into the field, prepare and seal one sample per shipment per matrix using water demonstrated to be free of the contaminants of concern (deionized water is appropriate). Place this sample in the cooler used to ship VOA samples. | Assign separate CLP Sample Numbers to the trip blanks. |
| Equipment Blank or Rinsate Blank | To check field decontamination procedures. | Collect when sampling equipment is decontaminated and reused in the field or when a sample collection vessel (bailer or beaker) will be used. Use blank water (water demonstrated to be organic-free, deionized or distilled for inorganics) to rinse water into the sample containers. | Assign separate CLP Sample Numbers to the equipment blanks. |
| Matrix Spike (MS) and Duplicate (MSD) ² (Organic Analysis Only) | To check accuracy and precision of organic analyses in specific sample matrices. | Collect from areas that are known or suspected to be contaminated. For smaller sampling events (i.e., 20 samples or less), MS/MSD additional volume should be collected in the first round of sampling and included in the first shipment of samples to the laboratory. Collect double or triple volume ³ for aqueous samples and soil VOA samples designated for MS/MSD analyses. Additional sample volume is not required for soil samples requiring SVOA, Pesticide, and/or Aroclor analysis. See Appendix B for VOA collection volumes. | Assign the same CLP Sample Number to the field sample and the extra volume for MS/MSD. Identify the sample designated for MS/MSD on the TR/COC Record. |
| Matrix Spike (MS) and Duplicate (MSD) (Inorganic Analysis Only) | To check accuracy and precision of inorganic analyses in specific sample matrices. | Collect from areas that are known or suspected to be contaminated. For smaller sampling events (i.e., 20 samples or less), Matrix Spike and Duplicates should be collected in the first round of sampling and included in the first shipment of samples to the laboratory. Additional sample volume may be required for inorganic analysis. ⁴ | Assign the same CLP Sample Number to the field sample and extra volume (if collected). Identify the sample(s) designated for Matrix Spike and Duplicates on the TR/COC Record. |
| PE Samples | Specially-prepared QC samples used to evaluate a laboratory's analytical proficiency. | The PE samples contain analytes with concentrations unknown to the laboratory. Designated Regional or authorized personnel (depending on Regional policy) arrange for Case-specific CLP PE samples to be prepared and shipped by the QATS contractor. The PE samples can be shipped to the site, or shipped per Regional direction. QATS provides the appropriate preparation instructions and chain-of-custody materials. | Samplers have no direct interaction with the PE sampling process, but should be aware that such samples do exist within the CLP sampling process. Samplers must, however, order PE samples and ship them to the laboratory if required by the Region. |

¹ Consult Regional or Project Manager Guidance for field QC sample frequencies; laboratory QC sample frequencies are generally fixed in the laboratory subcontracts or specified in analytical methods. Current frequency for MS/MSD (organic) and MS/duplicate (inorganic) for the CLP is one sample per twenty field sample of similar matrix.

² Samples sent under the Organic SOW (SOM01) do not require an MS or MSD for Trace VOA, VOA and BNA fractions, but the Region may opt to send them at their discretion.

³ Example of double volume: An aqueous sample for SVOA analysis would require the field sampler to collect at least 2 L of field sample and at least 1 L each for the MS and MSD samples for a total volume of 4 L. If Pesticide or Aroclor MS/MSD analyses are required for the same sample, an additional 4 L must be collected. Double volume is the MINIMUM allowable volume for samples designated for MS/MSD analysis. Triple volume may be sent for MS/MSD samples to allow for sufficient volume for these analyses in the event sample volume is lost as a result of samples breaking, leaking, or laboratory accidents.

⁴ Double volume may be sent for inorganic aqueous MS and MSD samples to allow for sufficient volume for these analyses in the event sample volume is lost as a result of samples breaking, leaking or laboratory accidents.

3.1.1.1 Collect Field QC Samples

Samplers can collect field QC samples and laboratory QC samples to verify that sample quality is maintained during a sampling project.

Field QC samples are designed to assess variability of the media being sampled and to detect contamination and sampling error in the field. The types of field QC samples that are generally collected include field duplicates and field blanks (such as equipment, trip, or rinse blanks). Generally, field duplicate samples should remain “blind” to the laboratory (i.e., they should have separate CLP Sample Numbers).

3.1.1.2 Collect Laboratory QC Samples

A laboratory QC sample is an additional analysis of a field sample, as required by the laboratory’s contract. There are three types of laboratory QC samples:

- MS [for organic and inorganic samples];
- MSD [for organic samples only]; and
- Duplicates [for inorganic samples only].



Samplers should obtain Regional guidance regarding the collection of MS and MSD samples (especially for organics analyses).

Samplers should select one sample per matrix per 20 samples as a “laboratory QC” sample. Designated organic laboratory QC samples should be noted on the Organic TR/COC Record. Designated inorganic laboratory QC samples should be noted on the Inorganic TR/COC Record. The laboratory QC sample must not be designated only in the “Field QC Qualifier” column on either the Organic or Inorganic TR/COC Records. Make sure that the laboratory QC sample is included in TR/COC Record samples to be used for the Laboratory QC field.

The sampler should select a field sample as the laboratory QC sample. If the sampler does not select a field sample as the laboratory QC sample, then it is possible that the laboratory could select the field blank (e.g., an equipment or rinsate blank) sample to meet contractual QC requirements. The use of field blanks for laboratory MS/MSD/Duplicate analysis reduces the usability of the data to assess data quality.



In the event of multiple sample shipments during a sampling event, it is recommended that the sampler submit laboratory QC samples in the first sample shipment.

3.1.2 Meet Volume, Preservation, and Holding Time Requirements

Samplers should refer to their project plans to obtain the specific sample volumes to be collected, the preservation needed for those samples, and the technical holding times under which they must submit samples to the scheduled CLP laboratory. Sample collection parameters (to include sample volumes, preservatives, and technical holding times) for organic collection and analysis are listed in Tables 3-2 and 3-3. Sample collection parameters for inorganic analysis and collection are listed in Table 3-4.

3.1.2.1 Collect Sample Volume

Collecting sufficient sample volume is critical. There must be sufficient physical sample volume for the analysis of all required parameters and completion of all QC determinations. The type of analytical procedure(s) to be performed will often dictate the sample volume to collect. For example, each water sample collected for VOA analysis by CLP SOW SOM01 or ILM05 requires a minimum of three vials, each filled completely to a 40 mL capacity. See Appendix C for information regarding the collection of VOAs in water. It is extremely important that samplers refer to their specific project plans to identify and collect the correct sample volume during each sampling event.

When sampling for VOAs in soils, samplers must use SW-846 Method 5035A guidelines included in Appendix B.

3.1.2.2 Preserve Samples

Degradation of some contaminants may occur naturally (e.g., VOAs). The sampler must chemically preserve some water samples for certain analytes before shipping them to the laboratory. The sampler should preserve and immediately cool all samples to 4°C ($\pm 2^\circ\text{C}$) upon collection and samples should remain cooled until the time of analysis (do not freeze water samples). Preservation techniques vary among Regions so the sampler should obtain Region-specific instructions and review the appropriate project plans and SOPs. See Appendix C for information regarding the collection of VOAs in water.

3.1.2.3 Ship within Holding Times

Samplers should ship samples to scheduled CLP laboratories as soon as possible after collection. Daily shipment of samples to CLP laboratories is preferred whenever possible. If samples cannot be shipped on a daily basis, they must be properly preserved and maintained to meet CLP-specified temperatures, holding times, and custody requirements.

The technical holding times are the maximum time allowed between a sample collection and the completion of the sample extraction and/or analysis. In contrast, contractual holding times are the maximum lengths of time that the CLP laboratory can hold the sample prior to extraction and/or analysis. These contractual holding times are described in the appropriate CLP SOW. Contractual holding times are shorter than the technical holding times to allow for sample packing and shipping.



If samplers are shipping samples after 5:00 PM ET, they must notify the RSCC (or designee) or SMO by 8:00 AM ET on the following business day. When making a Saturday delivery, samplers shall contact the RSCC (or designee) or SMO by 3:00 PM ET on the Friday prior to delivery.

Table 3-2. Sample Collection Requirements for CLP SOW SOM01 (VOAs)

| Matrix | Container Type | Sample Type | Minimum Number of Containers Needed | | | | Minimum Volume/Mass | Important Notes | Preservative | Technical Holding Time |
|-------------------|---|-----------------------------|-------------------------------------|-----|------------|-------|---------------------|---|--|------------------------|
| | | | with Water | Dry | % Moisture | TOTAL | | | | |
| Water | See Table 2-2, Reference Number 1. | Samples Only | - | - | - | 3 | Fill to capacity | Containers/vials must be filled to capacity with no headspace or air bubbles. Refer to Appendix C for samples requiring QC analyses. | Preserve to a pH of 2 with HCl and cool to 4°C (±2°C) immediately after collection. DO NOT FREEZE water samples. | 14 days |
| | | Samples with SIM | - | - | - | 4 | | | | |
| | | Samples with MS/MSD | - | - | - | 6 | | | | |
| | | Samples with SIM and MS/MSD | - | - | - | 8 | | | | |
| Soil/ Sediment | OPTION 1 Closed-system Vials See Table 2-2, Reference Number 1. | Samples Only | - | 3 | 1 | 4 | 5g | Place samples on side prior to being frozen. Refer to Appendix B for samples requiring QC analyses. | Frozen (-7°C to -15°C) or iced to 4° (±2°C). | 14 days |
| | | Samples with MS/MSD | - | 9 | 1 | 10 | | | | 48 hours |
| | OPTION 2 Closed-system Vials containing Water See Table 2-2, Reference Number 1. | Samples Only | 2 | 1 | 1 | 4 | 5g | Containers/vials must be filled to capacity with no headspace or air bubbles. Place samples on side prior to being frozen. Refer to Appendix B for samples requiring QC analyses. | Frozen (-7°C to -15°C) or iced to 4° (±2°C). DO NOT FREEZE water samples. | 14 days |
| | | Samples with MS/MSD | 6 | 1 | 5 | 12 | | | | 48 hours |
| | OPTION 3 See Table 2-2, Reference Number 7. | Samples Only | - | 3 | 1 | 4 | 5g | Refer to Appendix B for samples requiring QC analysis. | Frozen (-7°C to -15°C) or iced to 4°C (±2°C). | 48 hours |
| | | Samples with MS/MSD | - | 9 | 1 | 10 | | | | 48 hours |

Notes

- ¹ Minimum volume/mass to be collected in order to ensure sample analysis can be performed.
- ² Check Regional guidance regarding use of acid as a preservative of samples that may contain carbonates, residual chlorine, and other oxidants.
- ³ This technical holding time is calculated from the time of sample collection to sample extraction. Sample extracts are to be analyzed within 40 days of extraction. It is recommended that samplers ship samples to the laboratory on the same day that they are collected, or as soon as possible thereafter.
- ⁴ Check Regional guidance regarding use of acid preservatives when testing for carbonates, residual chlorine, and other oxidants.

Table 3-3. Sample Collection Requirements for CLP SOW SOM01 (SVOAs, Pesticides and Aroclors)

| Analysis | Matrix | Containers | Minimum Volume/ Mass | Important Notes | Preservative | Technical Holding Time |
|--------------------------|-------------------|---|---------------------------------|--|---|---------------------------------------|
| Semivolatile Analytes | Water | See Table 2-2, Reference Number 5. | 2L | If amber containers are not available, the samples should be protected from light. | Cool all samples to 4°C (±2°C) immediately after collection. DO NOT FREEZE water samples. | 7 days |
| | Soil/ Sediment | See Table 2-2, Reference Numbers 3 and 4. | Fill to capacity | | Cool all samples to 4°C (±2°C) immediately after collection. | 14 days |
| Pesticides/ Aroclors | Water | See Table 2-2, Reference Number 5. | 2L | If amber containers are not available, the samples should be protected from light. | Cool all samples to 4°C (±2°C) immediately after collection. DO NOT FREEZE water samples. | 7 days |
| | Soil/ Sediment | See Table 2-2, Reference Numbers 3 and 4. | Fill to capacity | | Cool all samples to 4°C (±2°C) immediately after collection. | 14 days |

Notes

- ¹ Minimum volume/mass to be collected in order to ensure sample analysis can be performed.
- ² Check Regional guidance regarding use of acid as a preservative of samples that may contain carbonates, residual chlorine, and other oxidants.
- ³ This technical holding time is calculated from the time of sample collection to sample extraction. Sample extracts are to be analyzed within 40 days of extraction. It is recommended that samplers ship samples to the laboratory on the same day that they are collected, or as soon as possible thereafter.
- ⁴ Check Regional guidance regarding use of acid preservatives when testing for carbonates, residual chlorine, and other oxidants.

Table 3-4. Sample Collection Requirements for CLP SOW ILM05

| Analysis | Matrix | Containers | Minimum Volume/ Mass ¹ | Important Notes | Preservative | Technical Holding Time ⁴ |
|---|-------------------|------------------------------------|--------------------------------------|--|---|--|
| Metals/ICP-AES and/or Mercury by CVAA | Water | See Table 2-2, Reference Number 2. | 1L | If collecting for both ICP-AES AND ICP-MS methods, a separate 1L volume of sample must be collected for each method per sample location. | Acidify to pH < 2 with HNO ₃ and cool to 4°C (±2°C) immediately after collection. ² NOT FREEZE water samples. DO | 6 months for all metals except Mercury (28 days) |
| | Soil/ Sediment | See Table 2-2, Reference Number 3. | Fill to capacity | | Cool to 4°C (±2°C) immediately after collection. | 6 months |
| Cyanide/ Spectrophotometric Determination ³ | Water | See Table 2-2, Reference Number 2. | 1L | | To neutralize residual chlorine, immediately upon collection, add 0.6 g ascorbic acid for each liter of sample collected. Add NaOH until pH >12 and cool to 4°C (±2°C) immediately after collection. ⁵ DO NOT FREEZE water samples. | 14 days |
| | Soil/ Sediment | See Table 2-2, Reference Number 3. | Fill to capacity | | Cool to 4°C (±2°C) immediately after collection. | 14 days |

Notes

¹ Minimum volume/mass to be collected in order to ensure sample analysis can be performed.

² Check Regional guidance regarding use of acid as a preservative of samples that may contain carbonates, residual chlorine, and other oxidants.

³ Samplers must test for sulfide and oxidizing agents (e.g., chlorine) in aqueous samples in the field upon collection. Please refer to the SAP and Appendix C for guidance. Sulfides adversely affect the analytical procedure. The following can be done to test for and neutralize sulfides. Place a drop of the sample on lead acetate test paper to detect the presence of sulfides. If sulfides are present, treat 25 mL more of the sample than that required for the cyanide determination with powdered cadmium carbonate or lead carbonate. Yellow cadmium sulfide or black lead sulfide precipitates if the sample contains sulfide. Repeat this operation until a drop of the treated sample solution does not darken the lead acetate test paper. Filter the solution through a dry filter paper into a dry beaker, and from the filtrate measure the sample to be used for analysis. Avoid a large excess of cadmium carbonate and a long contact time in order to minimize a loss by complication or occlusion of cyanide on the precipitated material. Sulfide removal should be performed in the field, if practical, prior to pH adjustment with NaOH.

⁴ This technical holding time is calculated from the time of sample collection to sample extraction. Sample extracts are to be analyzed within 40 days of extraction. It is recommended that samplers ship samples to the laboratory on the same day that they are collected, or as soon as possible thereafter.

3.2 Complete Documentation

Samplers must complete all documentation, including the recording of the CLP Sample Number on the sample container or bottle, sample labels, and chain-of-custody seals (as appropriate), the completion of the TR/COC Record, and the completion of field operations records (as necessary).

Samplers should use the FORMS II Lite software to create and print sample labels and the TR/COC Record. Samplers can create and print out two copies of a sample label and attach one to the sample container or bottle, and place the other on the sample tag that may be attached to the sample container or bottle.

Samplers are expected to review their project plans to determine what documentation they are expected to include during a sampling event. It is highly recommended that samplers provide documentation, even if the Region does not require it.



Under no circumstances should the site name appear on any documentation being sent to the laboratory.

An example of a packaged sample is shown in Figure 3-1. A description of each type of documentation and instructions for accurate completion are included in the following sections.

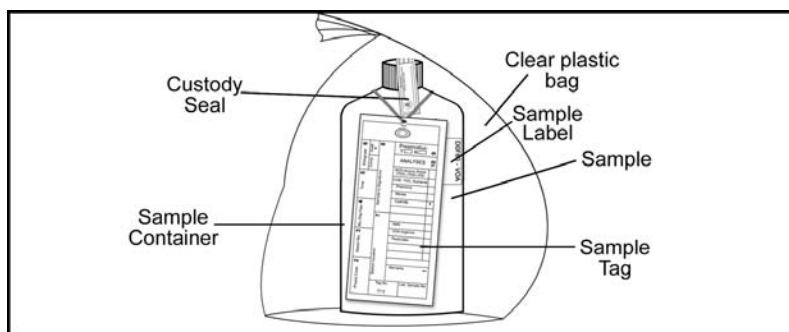


Figure 3-1. Packaged Sample with Identification and Chain-of-Custody Documentation (Excluding TR/COC Record)

3.2.1 Identify a Sample with a CLP Sample Number and SMO-assigned Case Number

The CLP Sample Number and SMO-assigned Case Number **must** be recorded on each sample taken during a sampling event (see Section 1.4.1.1). Samplers can record these numbers on the sample bottle or container using permanent ink. The numbers must also be recorded on the sample tag, if required.



Dissolved metal samples and total metal samples taken from the same sampling location cannot have the same CLP Sample Number because two different sets of data will be generated.

3.2.2 Complete TR/COC Records

A Traffic Report is used as physical evidence of sample custody and as a permanent record for each sample collected. A chain-of-custody record documents the exchange and transportation of samples from the field to the laboratory.

The ASB requires samplers to use the FORMS II Lite software to create documentation for all CLP sampling efforts. For assistance with obtaining or using the FORMS II Lite software, please contact the FORMS II Lite Help Desk at 703-818-4200 from 9:00 AM - 5:00 PM ET.

To meet CLP sample documentation and chain-of-custody requirements, the sampler must attach a separate TR/COC Record to each cooler they ship. The TR/COC Record must document each sample within the cooler. Samples shipped in other coolers should not be documented. This practice maintains the chain-of-custody for all samples in case of incorrect shipment.

If more than one TR/COC Record is used for the samples within one cooler, all of the records must have complete header information and original signatures. Samplers are responsible for the care and custody of samples from the time of collection to the time of shipment to the laboratories for analysis. A sample is considered under custody if:

- It is in possession or in view after being in possession;
- It was in possession and then secured or sealed to prevent tampering; or
- It was in possession when placed in a secured area.

Each time the custody of samples is turned over to another person, the TR/COC Record must be signed off by the former custodian and accepted by the new custodian. Samplers are, therefore, responsible for properly completing any forms or other Region-required documentation used to establish the chain-of-custody for each sample during a sampling event.

3.2.2.1 Complete a TR/COC Record Using the FORMS II Lite Software

Once the sampler inputs sample collection information into FORMS II Lite, a TR/COC Record will be generated electronically. The software automatically displays only the information to be entered by the sampler. FORMS II Lite then generates a laboratory and a Regional copy of the TR/COC Record (see Figures 3-2 through 3-5). The sampler can print out multiple copies of the TR/COC Record as necessary. The sampler must sign and submit original copies of the TR/COC Record as appropriate.

An electronic TR/COC Record created using the FORMS II Lite software contains basic header information; however, the sampler can also include some additional detailed information. For example, not only is the sample matrix listed on the electronic TR/COC Record, but the name of the sampler taking the sample can also be entered. Samplers should note that certain information will not appear on the electronic TR/COC Record (e.g., matrix and preservative descriptions).

3.2.2.2 Indicate Modified Analysis on FORMS II Lite TR/COC Records

When completing a TR/COC Record using FORMS II Lite, the sampler should identify any samples that will be analyzed using a CLP Modified Analysis. Samplers should indicate use of a Modified Analysis by creating a new analysis within the FORMS II Lite Wizard or through the FORMS II Lite Reference Tables. This newly-created analysis should contain the Modification Reference Number within the name assigned to the analysis. For example, if a Region submits a Modified Analysis for an additional analyte, and SMO assigns the Modification Reference Number 1301.0, the FORMS II Lite analysis could be named "VOA by M.A. 1301.0". The associated abbreviation for this analysis could be "VOA M.A.". If you have any questions regarding identification of Modified Analysis using FORMS II Lite, please contact the FORMS II Lite Help Desk at 703-818-4200 from 9:00 AM - 5:00 PM ET.

3.2.2.3 Make Manual Edits to Printed FORMS II Lite TR/COC Records

If a FORMS II Lite TR/COC Record has been printed and deletions or edits need to be made by the sampler, the following procedures must be followed:

- If making a deletion, manually cross out the information to be disregarded from the TR/COC Record, initial and date the deletion.
- If making an addition, enter the new information and initials and date the newly added information.



All modifications made on a printed TR/COC Record must be initialed and dated.

| USEPA Contract Laboratory Program Organic Traffic Report & Chain of Custody Record | | | | | | Case No: 39400 DAS No: DAS9000 SDG No: | | L | | | | | | | | | | | | | | | | | |
|--|---|--|-----------------------------------|---|-----------------------------|---|---------------|---------------------------------|---|--|--|---|--|--|--|---|--|--|--|---|--|--|--|--|--|
| Date Shipped: 2/20/2001 Carrier Name: DHL Airbill: 121212 Shipped to: Organic Laboratory 1234 Smith Drive Anywhere, USA 12345 (123) 456-7890 | | Chain of Custody Record <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 40%;">Relinquished By</th> <th style="width: 20%;">(Date / Time)</th> <th style="width: 40%;">Received By</th> <th style="width: 20%;">(Date / Time)</th> </tr> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td></tr> </table> | | Relinquished By | (Date / Time) | Received By | (Date / Time) | 1 | | | | 2 | | | | 3 | | | | 4 | | | | For Lab Use Only Lab Contract No: _____ Unit Price: _____ Transfer To: _____ Lab Contract No: _____ Unit Price: _____ | |
| Relinquished By | (Date / Time) | Received By | (Date / Time) | | | | | | | | | | | | | | | | | | | | | | |
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| 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORGANIC SAMPLE No. | MATRIX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No./ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | | INORGANIC SAMPLE No. | FOR LAB USE ONLY Sample Condition On Receipt | | | | | | | | | | | | | | | | |
| C0075 | Industrial Process Wastewater/ BOBBY SAMPLER | H/C | BNA/PEST (21), VOA 6486, 6487 (2) | | LOCATION ONE | S: 2/20/2001 16:02 E: 2/23/2001 16:02 | | MC0075 | | | | | | | | | | | | | | | | | |
| C0076 | Ground Water/ JOE SAMPLER | L/C | BNA/PEST (21), VOA 6494, 6495 (2) | | LOCATION TWO | S: 2/20/2001 16:01 E: 2/21/2001 16:01 | | MC0076 | | | | | | | | | | | | | | | | | |
| C0077 | Industrial Effluent Wastewater/ JOE SAMPLER | M/G | BNA/PEST (21), VOA 6502, 6503 (2) | | LOCATION ONE | S: 2/16/2001 15:55 E: 2/20/2001 15:55 | | MC0077 | | | | | | | | | | | | | | | | | |

| | | | | |
|---|--|---|----------------------------------|---|
| Shipment for Case Complete? <input checked="" type="checkbox"/> | Sample(s) to be used for laboratory QC: C0077 | Additional Sampler Signature(s): | Cooler Temperature Upon Receipt: | Chain of Custody Seal Number: |
| Analysis Key: Concentration: L = Low, M = Low/Medium, H = High | | Type/Designate: Composite = C, Grab = G | | Custody Seal Intact? <input type="checkbox"/> Shipment Iced? <input type="checkbox"/> |
| BNA/PEST = CLP TCL Semivolatiles and Pesticides/PC, VOA = CLP TCL Volatiles | | | | |

TR Number: 3-103823254-022001-0001
PR provides preliminary results. Requests for preliminary results will increase analytical costs.
 Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

LABORATORY COPY

F2V5.1.047 Page 1 of 1

Figure 3-2. Organic Traffic Report & Chain of Custody Record (Laboratory Copy)

| | | | | | | | | | |
|--|--|--|--------------------------------------|--|--|---|--|-------------------------|--|
| USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record | | | | | | Case No: 39400 DAS No: DAS9000 SDG No: | | L | |
| Date Shipped: 2/20/2001 Carrier Name: DHL Airbill: 121212 Shipped to: Inorganic Laboratory 1234 Smith Drive Anywhere, USA 12345 (123) 456-7890 | | | Chain of Custody Record | | | Sampler Signature: Received By (Date / Time) | | For Lab Use Only | |
| | | | Relinquished By (Date / Time) | | | Lab Contract No: _____ Unit Price: _____ Transfer To: _____ Lab Contract No: _____ Unit Price: _____ | | | |
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| | | | 4 | | | | | | |

| INORGANIC SAMPLE No. | MATRX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No./ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | ORGANIC SAMPLE No. | FOR LAB USE ONLY Sample Condition On Receipt |
|-------------------------|--|---------------|--|-----------------------------------|---------------------|------------------------------|-----------------------|---|
| MC0075 | Industrial Process Wastewater/ BOBBY SAMPLER | H/C | Al (21), Ba (21), Ca (21), Cr (21), TM/CN (21) | 6481, 6482, 6483, 6484, 6485 (5) | LOCATION ONE | S: 2/20/2001 E: 2/23/2001 | C0075 | |
| MC0076 | Ground Water/ JOE SAMPLER | L/C | Al (21), Ba (21), Ca (21), Cr (21), TM/CN (21) | 6489, 6490, 6491, 6492, 6493 (5) | LOCATION TWO | S: 2/20/2001 E: 2/21/2001 | C0076 | |
| MC0077 | Industrial Effluent Wastewater/ JOE SAMPLER | M/G | Al (21), Ba (21), Ca (21), Cr (21), TM/CN (21) | 6497, 6498, 6499, 6500, 6501 (5) | LOCATION ONE | S: 2/16/2001 E: 2/20/2001 | C0077 | |

| | | | | |
|---|---|---|----------------------------------|---|
| Shipment for Case Complete? <input type="checkbox"/> | Sample(s) to be used for laboratory QC: MC0077 | Additional Sampler Signature(s): | Cooler Temperature Upon Receipt: | Chain of Custody Seal Number: |
| Analysis Key: Concentration: L = Low, M = Low/Medium, H = High | | Type/Designate: Composite = C, Grab = G | | Custody Seal Intact? <input type="checkbox"/> Shipment Iced? <input type="checkbox"/> |
| Al = Aluminum, Ba = Barium, Ca = Calcium, Cr = Chromium, TM/CN = CLP TAL Total Metals and Cyanide | | | | |

TR Number: 3-103823254-022001-0003

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
 Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

LABORATORY COPY

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Figure 3-3. Inorganic Traffic Report & Chain of Custody Record (Laboratory Copy)

| USEPA Contract Laboratory Program Organic Traffic Report & Chain of Custody Record | | | | | | Case No: 39400 DAS No: DAS9000 | | R | | | | | | | | | | | | | | | | | | | | | |
|---|--|---------------|--|-----------------------------------|---------------------|--|-------------------------|-----------------|---------------|--|--|--|--|--|--|--|--|---|--|-------------|---------------|--|--|--|--|--|--|--|--|
| Region: 3 Project Code: QW-123 Account Code: ACCT000 CERCLIS ID: Spill ID: ID3 Site Name/State: REAL SITE, UT Project Leader: DAN SAMPLER Action: Other Sampling Co: SMITH CO. | | | Date Shipped: 2/20/2001 Carrier Name: DHL Airbill: 121212 Shipped to: Organic Laboratory 1234 Smith Drive Anywhere, USA 12345 (123) 456-7890 | | | Chain of Custody Record <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Relinquished By</th> <th style="width: 50%;">(Date / Time)</th> </tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> | | Relinquished By | (Date / Time) | | | | | | | | | Sampler Signature: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Received By</th> <th style="width: 50%;">(Date / Time)</th> </tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> | | Received By | (Date / Time) | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORGANIC SAMPLE No. | MATRIX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No./ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | INORGANIC SAMPLE No. | QC Type | | | | | | | | | | | | | | | | | | | | | |
| C0075 | Industrial Process Wastewater/ BOBBY SAMPLER | H/C | BNA/PEST (21), VOA (21) | 6486, 6487 (2) | LOCATION ONE | S: 2/20/2001 16:02 E: 2/23/2001 16:02 | MC0075 | -- | | | | | | | | | | | | | | | | | | | | | |
| C0076 | Ground Water/ JOE SAMPLER | L/C | BNA/PEST (21), VOA (21) | 6494, 6495 (2) | LOCATION TWO | S: 2/20/2001 16:01 E: 2/21/2001 16:01 | MC0076 | Spike | | | | | | | | | | | | | | | | | | | | | |
| C0077 | Industrial Effluent Wastewater/ JOE SAMPLER | M/G | BNA/PEST (21), VOA (21) | 6502, 6503 (2) | LOCATION ONE | S: 2/16/2001 15:55 E: 2/20/2001 15:55 | MC0077 | -- | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|---|--|---|-------------------------------|
| Shipment for Case Complete? N | Sample(s) to be used for laboratory QC: C0077 | Additional Sampler Signature(s): | Chain of Custody Seal Number: |
| Analysis Key: BNA/PEST = CLP TCL Semivolatiles and Pesticides/PC; VOA = CLP TCL Volatiles | | Concentration: L = Low, M = Low/Medium, H = High Type/Designate: Composite = C, Grab = G | Shipment Iced? _____ |

TR Number: 3-103823254-022001-0001
 PR provides preliminary results. Requests for preliminary results will increase analytical costs.
 Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

REGION COPY

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Figure 3-4. Organic Traffic Report & Chain of Custody Record (Region Copy)

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---------------------------|---|--|-----------------------------|--|-------|-------------------------------|--------------------|---------------------------|--|---|--|--|--|---|--|--|--|---|--|--|--|---|--|--|--|-----------------------------------|--|
| USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record | | | | | | Case No: Y6767 DAS No: DAS9000 | | R | | | | | | | | | | | | | | | | | | | | | |
| Region: 3 Project Code: QW-123 Account Code: ACCT000 CERCLIS ID: Spill ID: ID3 Site Name/State: REAL SITE, UT Project Leader: DAN SAMPLER Action: Other Sampling Co: SMITH CO. | | | Date Shipped: 2/20/2001 Carrier Name: DHL Airbill: 121212 Shipped to: Clayton Environmental Consultants, Inc 22345 Roethel Drive Novi MI 48375 (248) 344-1770 | | | Chain of Custody Record <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">Relinquished By (Date / Time)</td> <td colspan="2" style="text-align: center;">Received By (Date / Time)</td> </tr> <tr><td colspan="2">1</td><td colspan="2"></td></tr> <tr><td colspan="2">2</td><td colspan="2"></td></tr> <tr><td colspan="2">3</td><td colspan="2"></td></tr> <tr><td colspan="2">4</td><td colspan="2"></td></tr> </table> | | Relinquished By (Date / Time) | | Received By (Date / Time) | | 1 | | | | 2 | | | | 3 | | | | 4 | | | | Sampler Signature: | |
| Relinquished By (Date / Time) | | Received By (Date / Time) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INORGANIC SAMPLE No. | MATRIX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No/ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | | ORGANIC SAMPLE No. | QC Type | | | | | | | | | | | | | | | | | | | | |
| MC0075 | Industrial Process Wastewater/ BOBBY SAMPLER | H/C | Al (21), Ba (21), Ca (21), Cr (21), TM/CN (21) | 6481, 6482, 6483, 6484, 6485 (5) | LOCATION ONE | S: 2/20/2001 16:02 E: 2/23/2001 16:02 | C0075 | -- | | | | | | | | | | | | | | | | | | | | | |
| MC0076 | Ground Water/ JOE SAMPLER | L/C | Al (21), Ba (21), Ca (21), Cr (21), TM/CN (21) | 6489, 6490, 6491, 6492, 6493 (5) | LOCATION TWO | S: 2/20/2001 16:01 E: 2/21/2001 16:01 | C0076 | Spike | | | | | | | | | | | | | | | | | | | | | |
| MC0077 | Industrial Effluent Wastewater/ JOE SAMPLER | M/G | Al (21), Ba (21), Ca (21), Cr (21), TM/CN (21) | 6497, 6498, 6499, 6500, 6501 (5) | LOCATION ONE | S: 2/16/2001 15:55 E: 2/20/2001 15:55 | C0077 | -- | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|---|--|---|-------------------------------|
| Shipment for Case Complete? N | Sample(s) to be used for laboratory QC: | Additional Sampler Signature(s): | Chain of Custody Seal Number: |
| | | | |
| Analysis Key: | Concentration: L = Low, M = Low/Medium, H = High | Type/Designate: Composite = C, Grab = G | Shipment Iced? _____ |
| Al = Aluminum, Ba = Barium, Ca = Calcium, Cr = Chromium, TM/CN = CLP TAL Total Metals and Cyanide | | | |

TR Number: 3-103823254-022001-0003
PR provides preliminary results. Requests for preliminary results will increase analytical costs.
 Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

REGION COPY

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Figure 3-5. Inorganic Traffic Report & Chain of Custody Record (Region Copy)

3.2.3 Complete and Attach Custody Seals

Custody seals are usually pre-printed stickers that are signed (or initialed) and dated by the sampler after sample collection and placed on sample bottles or containers and/or shipping coolers or containers (see Figure 3-6). The custody seals document who sealed the sample container and verifies that the sample has not been tampered with. The seals must be placed such that they will break if the sample bottle or container or the shipping cooler or container is tampered with or opened after leaving custody of samplers. Custody seals can also be used to maintain custody of other items such as envelopes containing videotapes of the sample collection process.



Custody seals should never be placed directly onto a coring tool used as a transport device (e.g., 5 g Sampler) or tared, 40 mL closed-system vials. The seals must be placed on the bag for the coring tool used as a transport device, or on the bag used to enclose the vials. Refer to Appendix B for details.


| | | | | |
|---|----------------------|------|----------------|------|
|  UNITED STATES ENVIRONMENTAL PROTECTION AGENCY OFFICIAL SAMPLE SEAL | SAMPLE NO. | DATE | SEAL BROKEN BY | DATE |
| | SIGNATURE | | | |
| | PRINT NAME AND TITLE | | | |

Figure 3-6. Custody Seal

Instructions for completing and attaching a custody seal are included in Table 3-5.

Table 3-5. Completing and Attaching a Custody Seal

| Step | Action | Important Notes |
|------|--|--|
| 1 | Record the CLP Sample Number. | The space for the CLP Sample Number does not need to be completed on custody seals being placed on the opening of a cooler, only on those being placed on the opening of sample bottles or containers. |
| 2 | Record the month, day, and year of sample collection. | |
| 3 | Sign the seal in the Signature field. | |
| 4 | Print your name and title in the Print Name and Title field. | |
| 5 | Place the custody seal over the edge of the sample bottle or container such that it will break if tampered with. | Custody seals can be placed directly on any sample container except for coring tools used as a transport device (e.g., 5 g Samplers) and tared VOA bottles. If packing coring tools used as a transport device or tared VOA bottles, place them in a clear plastic bag and place the custody seal on the outside of the bag. |
| 6 | If possible, cover the custody seal with clear plastic tape to protect it. | Take special care to not place the protective tape over the seal in such a way that it can be removed and then re-attached without signs of tampering. |

The use and type of custody seals can vary by Region or collecting organization. Samplers should obtain the appropriate custody seals and specific instructions for correctly attaching them from the RSCC.

3.2.4 Complete and Attach Sample Labels

Samplers affix sample labels to each sample container. A sample label must contain the associated CLP Sample Number (either written or pre-printed), SMO-assigned Case Number, and the preservative used. It must also denote the analysis/fraction. Samplers may also include additional information such as the station location or the date/time of collection. Samplers should use FORMS II Lite to create and print sample labels. The sampler can print two labels and attach one to the sample container or bottle, and place the other label on the sample tag that should also be attached to the sample container or bottle. The

labels should then be covered with clear packaging tape to protect the label and maintain legibility. If handwriting a sample label, the sampler should complete the label information using waterproof ink, place the label on the outside of the sample bottle or container, then cover the label with clear packaging tape to protect the label and maintain legibility (see Figure 3-1).



Do not attach labels to tared VOA sample vials. A label should already be pre-attached to the tared vial.

3.2.5 Complete and Attach Sample Tags

To support use of sample data in potential enforcement actions, sample characteristics other than on-site measurements (e.g., pH, temperature, conductivity) can be identified with a sample tag. Typically, site-specific information is written on the tags using waterproof ink. The use and type of sample tags may vary by Region. For each sampling event, samplers should receive the required sample tags and type of information to include from the RSCC. The sampler can use FORMS II Lite to create and print out multiple sample labels, one of which can be attached to the sample tag and then covered with clear packaging tape to protect the label and maintain legibility. If FORMS II Lite-created sample labels are not available, a detailed set of instructions for completing and attaching a handwritten sample tag are included in Table 3-6.



The use and type of sample tags may vary among Regions.

Table 3-6. Completing and Attaching a Handwritten Sample Tag

| Step | Action | Important Notes |
|------|---|---|
| 1 | Under the “Remarks” heading, record the CLP Sample Number and SMO-assigned Case Number. | Make sure to record the correct CLP Sample Number and SMO-assigned Case Number in a legible manner. |
| 2 | Record the project code (e.g., Contract Number, Work Assignment Number, Interagency Agreement Number, etc.) assigned by USEPA. | |
| 3 | Enter the station number assigned by the sampling team coordinator. | |
| 4 | Record the month, day, and year of sample collection. | |
| 5 | Enter the military time of sample collection (e.g., 13:01 for 1:01 PM). | |
| 6 | Identify the designate and place an “X” in either the “Comp.” or “Grab” box if the sample is either a composite or grab sample. | |
| 7 | Record the station location. | |
| 8 | Sign the sample tag in the Signature area. | |
| 9 | Place an “X” in the box next to Yes or No to indicate if a preservative was added to the sample. | |
| 10 | Under “Analyses”, place an “X” in the box next to the parameters for which the sample is to be analyzed. | |
| 11 | Leave the box for “Laboratory Sample Number” blank. | |
| 12 | It is recommended that the sample tag be attached to the neck of the sample bottle or container using regular string, stretch string, or wire (see Figure 3-1). | Do NOT use wire to attach a sample tag to a metals sample. |


An example of a completed sample tag is included in Figure 3-7 below:

| | | | | | | | | | |
|---------------------------------|---------------------------|---------------------------|---------------|-------------------------------------|---|--------------------------|---------|---------------------|-----------|
| Project Code 2 00-030 | | Station No. 3 1 | | Mo./Day/Year 4 01/10/2004 | | Time 5 8:45 AM | | Designate: 6 | |
| | | | | | | Comp. | | Grab x | |
| 3-3001 Tag No. | Station Location 7 | | | | Sampler's (Signature) 8 <i>John Smith</i> | | | | |
| | DD001 Lab. Sample No. | Remarks: 1 | SVOA organics | Pesticides | VOA organics x | ABN | Cyanide | Metals | Phenolics |
| ANALYSES 10 | | | | | | | | | |
| | | | | | | | | | |

Figure 3-7. Completed Sample Tag

3.3 Provide Sample Receipt

After samples have been taken from private property, the sampler should prepare a receipt for these samples and provide this receipt to the property owner. This is especially important when sampling on private property since these samples could be used during future litigation and the receipt will verify that the owner granted approval for the removal of the samples from the property. An example of a sample receipt created using FORMS II Lite is shown in Figure 3-8.

|  EPA Region 3 U.S. ENVIRONMENTAL PROTECTION AGENCY | | RECEIPT FOR SAMPLES | | | | | |
|---|----------------------|----------------------------|--|--|-----------------------|---------------------|---|
| PROJECT NO. QW-123 | | PROJECT NAME | | NAME & LOCATION OF FACILITY/SITE EXAMPLE SITE | | | |
| SAMPLERS: (SIGNATURES) | | | | | | | |
| STATION NO. | LOCATION/DESCRIPTION | DATE | TIME | Comp/Grab | NO. OF EPA CONTAINERS | SPLIT SAMPLE Y OR N | EPA SAMPLE TAG NO.'S |
| STATION ONE | LOCATION ONE | 2/20/2001 | 15:55 | G | 11 | Yes | 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122 |
| STATION ONE | LOCATION TWO | 2/20/2001 | 16:01 | C | 11 | Yes | 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133 |
| STATION TWO | LOCATION ONE | 2/20/2001 | 16:02 | C | 11 | Yes | 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144 |
| SPLIT SAMPLES TRANSFERRED BY: | | DATE | SPLIT SAMPLES RECEIVED BY <input type="checkbox"/> OR DECLINED BY <input type="checkbox"/> | | DATE/TIME | | |
| (PRINT) | | | (PRINT) | | | | |
| (SIGN) | | TIME | (SIGN) | | TELEPHONE | | |
| | | | TITLE | | | | |

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Figure 3-8. Sample Receipt Created Using the FORMS II Lite Software

3.4 Pack and Ship Samples

Once the samples have been collected, it is very important that the sampler properly package the samples for shipment and ensure that the samples are sent to the appropriate laboratory as quickly as possible. Prompt and proper packaging of samples will:

- Protect the integrity of samples from changes in composition or concentration caused by bacterial growth or degradation from increased temperatures;
- Reduce the chance of leaking or breaking of sample containers that would result in loss of sample volume, loss of sample integrity, and exposure of personnel to toxic substances; and
- Help ensure compliance with shipping regulations.

3.4.1 Sample Containers

Once samples are collected, they must be stored in conditions that maintain sample integrity. All samples should be placed in shipping containers or other suitable containers with ice to reduce the temperature as soon as possible after collection. Ideally, all samples should be shipped the day of collection for overnight delivery to the laboratory. If samples cannot be shipped on the day of collection, the sample temperature should be maintained at 4°C ($\pm 2^\circ\text{C}$) until they are shipped to the laboratory.

One CLP RAS sample may be contained in several bottles and vials. For example, one soil sample may consist of all containers needed for three of the analytical fractions available under this service (i.e., SVOA fraction, Pesticide fraction, and Aroclor fraction), even though the fractions are collected in separate containers. Therefore, the analysis to be performed and the matrix type will determine the type of container(s) that will be used, as well as the volume that must be collected for that particular sample fraction.

3.4.2 Inventory of Samples and Documentation

Prior to shipment, samplers should conduct an inventory of the contents of the shipping cooler or container against the corresponding TR/COC Record when packing for shipment to laboratories. An inventory will ensure that the proper number of containers have been collected for each analysis of the samples, that the required PE and QC samples and cooler temperature blanks are included, and the correct Sample Numbers and fractions have been assigned to each sample.

3.4.3 Shipping Regulations

Sample shipping personnel are legally responsible for ensuring that the sample shipment will comply with all applicable shipping regulations. For example, hazardous material samples must be packaged, labeled, and shipped in compliance with all IATA Dangerous Goods regulations or DOT regulations and USEPA guidelines. Refer to Appendix B for detailed shipping guidelines when using SW-846 Method 5035A to preserve and ship samples.

3.4.4 Sample Packaging for Shipment

Samplers are responsible for the proper packaging of samples for shipment. To ensure that samples are appropriately packaged (e.g., to avoid breakage and/or contamination) the sampler should consult their respective project plans to determine the proper packing and shipping procedures. The sampler must determine the sample type, pack the shipping containers correctly, include necessary paperwork, label and seal shipping containers or coolers, and ship the samples.

3.4.4.1 Determine the Sample Type and Container

Samplers should know what kinds of samples they are handling to ensure proper packaging. Samplers should refer to their appropriate project plans to determine which type of sample container should be used for each type of sample being taken during the sampling event.



Please follow Regional guidance with reference to samples containing dioxin or radioactive waste.

3.4.4.2 Pack Shipping Containers

It is imperative that samples are correctly and carefully packed in shipping containers to prevent the sample containers from breaking or leaking. Samplers must prepare and pack a shipping cooler or container according to the instructions outlined in Table 3-7.

Table 3-7. Packing Samples for Shipment

| Step | Action | Important Notes |
|------|---|--|
| 1 | Seal all drain holes in the shipping container, both inside and out, to prevent leakage in the event of sample breakage. | |
| 2 | Check all lids/caps to make sure the samples are tightly sealed and will not leak. | |
| 3 | Seal samples within a clear plastic bag. | Custody seals can be placed directly on any sample container except for coring tools used as a transport device (e.g., 5 g Samplers) and tared VOA bottles. If packing coring tools used as a transport device or tared VOA bottles, place them in a clear plastic bag and place the custody seal on the outside of the bag. |
| 4 | Fully chill samples to 4°C ($\pm 2^\circ\text{C}$) prior to placement within suitable packing materials. | |
| 5 | Prior to placing samples within the shipping cooler, it is recommended that samplers line shipping containers with non-combustible, absorbent packing material. | |
| 6 | Place samples in CLEAN, sealed, watertight shipping containers (metal or hard plastic coolers). | |
| 7 | Conduct an inventory of the contents of the shipping cooler/container against the corresponding TR/COC Record. | |
| 8 | Cover samples in double-bagged ice to prevent water damage to packing materials. | Do NOT pour loose ice directly into the sample cooler. The ice is used to maintain the temperature of the samples within the shipping cooler. |
| 9 | It is recommended a temperature blank be included within each cooler being shipped. | The temperature blank is generally a 40 L vial filled with water and labeled “temperature blank” but does not have a Sample Number. |
| 10 | Ensure that the site name or other site-identifying information does not appear on any documentation being sent to the laboratory. | The laboratory should not receive any site-identifying information. |

3.4.4.3 Include Necessary Paperwork

Samplers must properly place the necessary paperwork in the shipping cooler. All paperwork must be placed in a plastic bag or pouch and then secured to the underside of the shipping cooler lids (see Figure 3-9).

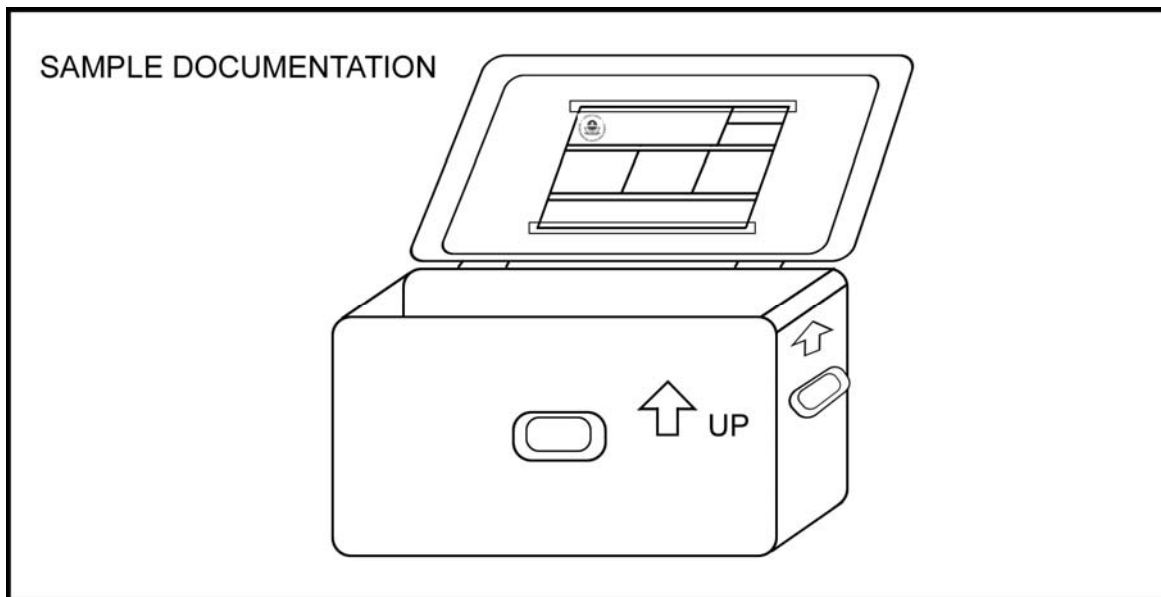


Figure 3-9. Sample Cooler with Attached TR/COC Record and Cooler Return Documentation

Necessary paperwork includes TR/COC Records and sample weight logs (see Figure 3-10), if required (for VOA samples). Samplers should contact their RSCC (or designee) for specific paperwork requirements.

| USEPA Contract Laboratory Program Sample Weight Log | | | | | | | | | |
|---|---------------------------|-------------------|--------------|-----------------------|---------------------|--------------------------------|----------------------|----------------------|-------------------------|
| Shipped to: AAA Testing Laboratory 1700 Mill Avenue Houston TX 77099 (281) 983-1234 | | | | | | Case No. 39563 | | | |
| | | | | | | DAS No. DAS34 | | | |
| | | | | | | Date Shipped: 9/29/2003 | | | |
| Sample No. | Matrix | Analysis | Preservative | Bottle/ Tag Number | Tared Weight (g) | Final Weight (g) | Sample Weight (g) | Laboratory Weight | Traffic Report No. |
| C0036 | Subsurface Soil (>12") | CLP TCL Volatiles | Ice Only | 199548 | 32.80 | 37.20 | 4.40 | | 3-103018225-092903-0001 |
| C0036 | Subsurface Soil (>12") | CLP TCL Volatiles | Ice Only | 199547 | 32.10 | 38.30 | 6.20 | | 3-103018225-092903-0001 |
| C0036 | Subsurface Soil (>12") | CLP TCL Volatiles | Ice Only | 199549 | 31.20 | 38.60 | 7.40 | | 3-103018225-092903-0001 |
| C0037 | Surface Soil (0"-12") | CLP TCL Volatiles | Ice Only | 199552 | 32.00 | 36.90 | 4.90 | | 3-103018225-092903-0001 |
| C0037 | Surface Soil (0"-12") | CLP TCL Volatiles | Ice Only | 199551 | 32.40 | 37.10 | 4.70 | | 3-103018225-092903-0001 |
| C0037 | Surface Soil (0"-12") | CLP TCL Volatiles | Ice Only | 199550 | 31.90 | 35.90 | 4.00 | | 3-103018225-092903-0001 |
| Completed By: | | | | | Date: | | | | |
| All weights are measured in grams | | | | | | | | | |

Figure 3-10. Sample Weight Log

3.4.4.4 Return Sample Shipping Coolers

CLP laboratories must routinely return sample shipping coolers within 14 calendar days following shipment receipt. Therefore, the sampler should also include cooler return instructions with each shipment. The sampler (not the CLP laboratory) is responsible for paying for return of the cooler and should also include shipping airbills bearing the sampler's account number, as well as a return address to allow for cooler return.

3.4.4.5 Label and Seal Sample Shipping Coolers

After samples are packaged within shipping coolers, samplers must carefully secure the top and bottom of the coolers with tape, place return address labels clearly on the outside of the cooler, and attach the required chain-of-custody seals (see Figure 3-11).

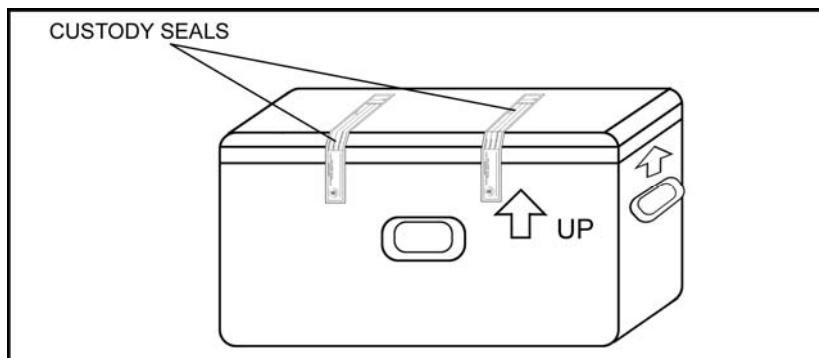


Figure 3-11. Shipping Cooler with Custody Seals

If more than one cooler is being delivered to a laboratory, samplers should mark each cooler as “1 of 2”, “2 of 2”, etc. In addition, samplers must accurately complete and attach shipping airbill paperwork for shipment of the samples to the laboratory. An airbill, addressed to the Sample Custodian of the receiving laboratory, should be completed for each cooler shipped. Samplers should receive the correct name, address, and telephone number of the laboratory to which they must ship samples from the RSCC or SMO. To avoid delays in analytical testing, samplers should make sure they are sending the correct types of samples to the correct laboratory when collecting samples for multiple types of analysis. For example, inorganic samples may be shipped to one laboratory for analysis, while organic samples may need to be shipped to another laboratory.

3.4.4.6 Ship Samples

The sampling contractor should ensure that samplers know the shipping company's name, address, and telephone number. In addition, they should be aware of the shipping company's hours of operation, shipping schedule, and pick-up/drop-off requirements.

Overnight Delivery

It is imperative that samples be sent via overnight delivery. Delays caused by longer shipment times may cause technical holding times to expire, which in turn may destroy sample integrity or require the recollection of samples for analysis.

Saturday Delivery

For shipping samples for Saturday delivery, the sampler **MUST** contact the RSCC (or their designee) or SMO so that SMO will receive the delivery information by 3:00 PM ET on the Friday prior to delivery.

3.4.5 Shipment Notification

When samples are shipped to CLP Laboratories, samplers **must immediately** report all sample shipments to the RSCC (or their designee) or to SMO. **Under no circumstances should the sampler contact the laboratory directly.** If samplers are shipping samples after 5:00 PM ET, they must notify the RSCC (or

designee) or SMO by 8:00 AM ET on the following business day. Samplers should receive the name and phone number of the appropriate SMO coordinator to contact from the Region/RSCC.

Samplers must provide the following information to the RSCC (or their designee) or to SMO:

- Name and phone number at which they can easily be reached (preferably closest on-site phone number if still in the field);
- SMO-assigned Case Number (see Section 2.4.1);
- Number, concentration, matrix and analysis of samples being shipped;
- Name of laboratory (or laboratories) to which the samples were shipped;
- Airbill number(s);
- Date of shipment;
- Case status (i.e., whether or not the Case is complete);
- Problems encountered, special comments, or any unanticipated issues;
- When to expect the next anticipated shipment; and
- An electronic export of the TR/COC Record (must be sent as soon as possible after sample shipment). For information regarding electronic export of TR/COC Records, refer to the following Web site:

<http://www.epa.gov/superfund/programs/clp/f2lsubmit.htm>



For Saturday delivery, samplers **MUST** contact the RSCC (or their designee) or SMO so that SMO will receive the delivery information by 3:00 PM ET on the Friday prior to delivery.

Samplers should be aware if their Region requires them to notify the RSCC (or designee) and/or SMO of sample shipment.

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Appendix A: Functions within a Sampling Project

The following table describes Quality Assurance Project Plan (QAPP) requirements taken from *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5).

| Functions Within a Sampling Project | Elements of that Function |
|---|--|
| <i>Project Management</i> | |
| Project/Task Organization | Identifies the individuals or organizations participating in the project and defines their specific roles and responsibilities. |
| Problem Definition/Background | States the specific problem to be solved or decision to be made and includes sufficient background information to provide a historical and scientific perspective for each particular project. |
| Project/Task Description | Describes the work to be performed and the schedule for implementation to include: <ul style="list-style-type: none"> • Measurements to be made during the course of the project; • Applicable technical, regulatory, or program-specific quality standards, criteria, or objectives; • Any special personnel and equipment requirements; assessment tools needed; and • A work schedule and any required project and quality records, including types of reports needed. |
| Quality Objectives and Criteria | Describes the project quality objectives and measurement performance criteria. |
| Special Training/Certification | Ensures that any specialized training for non-routine field sampling techniques, field analyses, laboratory analyses, or data validation should be specified. |
| Documents and Records | <ul style="list-style-type: none"> • Itemizes the information and records that must be included in the data report package and specifies the desired reporting format for hard copy and electronic forms, when used. • Identifies any other records and/or documents applicable to the project such as audit reports, interim progress reports, and final reports that will be produced. • Specifies or references all applicable requirements for the final disposition of records and documents, including location and length of retention period. |
| <i>Data Generation and Acquisition</i> | |
| Sampling Process Design (Experimental Design) | <ul style="list-style-type: none"> • Describes the experimental design or data collection design for the project. • Classifies all measurements as critical or non-critical. |
| Sampling Methods | <ul style="list-style-type: none"> • Describes the procedures for collecting samples and identifies sampling methods and equipment. Includes any implementation requirements, support facilities, sample preservation requirements, and materials needed. • Describes the process for preparing and decontaminating sampling equipment to include the disposal of decontamination by-products, selection and preparation of sample containers, sample volumes, preservation methods, and maximum holding times for sampling, preparation, and/or analysis. • Describes specific performance requirements for the method. • Addresses what to do when a failure in sampling occurs, who is responsible for corrective action, and how the effectiveness of the corrective action shall be determined and documented |
| Sample Handling and Custody | <ul style="list-style-type: none"> • Describes the requirements and provisions for sample handling and custody in the field, laboratory, and transport, taking into account the nature of the samples, the maximum allowable sample holding times before extraction and analysis, and the available shipping options and schedules. • Includes examples of sample labels, custody forms, and sample custody logs. |

| | |
|---|---|
| Analytical Methods | <ul style="list-style-type: none"> Identifies the analytical methods and equipment required, including sub-sampling or extraction methods, waste disposal requirements (if any), and specific method performance requirements. Identifies analytical methods by number, date, and regulatory citation (as appropriate). If a method allows the user to select from various options, the method citations should state exactly which options are being selected. Addresses what to do when a failure in the analytical system occurs, who is responsible for corrective action, and how the effectiveness of the corrective action shall be determined and documented. Specifies the laboratory turnaround time needed, if important to the project schedule. Specifies whether a field sampling and/or laboratory analysis Case Narrative is required to provide a complete description of any difficulties encountered during sampling or analysis. |
| Quality Control (QC) | <ul style="list-style-type: none"> Identifies required measurement QC checks for both the field and laboratory. States the frequency of analysis for each type of QC check, and the spike compounds sources and levels. States or references the required control limits for each QC check and corrective action required when control limits are exceeded and how the effectiveness of the corrective action shall be determined and documented. Describes or references the procedures to be used to calculate each of the QC statistics. |
| Instrument/Equipment Testing, Inspection, and Maintenance | <ul style="list-style-type: none"> Describes how inspections and acceptance testing of environmental sampling and measurement systems and their components will be performed and documented. Identifies and discusses the procedure by which final acceptance will be performed by independent personnel. Describes how deficiencies are to be resolved and when re-inspection will be performed. Describes or references how periodic preventative and corrective maintenance of measurement or test equipment shall be performed. Identifies the equipment and/or system requiring periodic maintenance. Discusses how the availability of spare parts identified in the operating guidance and/or design specifications of the systems will be assured and maintained. |
| Instrument/Equipment Calibration and Frequency | <ul style="list-style-type: none"> Identifies all tools, gauges, instruments, and other sampling, measuring, and test equipment used for data collection activities affecting quality that must be controlled, and at specific times, calibrated to maintain performance within specified limits. Identifies the certified equipment and/or standards used for calibration. Describes or references how calibration will be conducted using certified equipment and/or standards with known valid relationships to nationally recognized performance standards. If no such standards exist, documents the basis for calibration. Indicates how records of calibration shall be maintained and traced to the instrument. |
| Inspection/Acceptance of Supplies and Consumables | <ul style="list-style-type: none"> Describes how and by whom supplies and consumables shall be inspected and accepted for use in the project. States acceptance criteria for such supplies and consumables. |
| Non-direct Measurements | <ul style="list-style-type: none"> Identifies any types of data needed for project implementation or decision-making that are obtained from non-measurement sources (e.g., computer databases, programs, literature files, historical databases). Describes the intended use of data. Defines the acceptance criteria for the use of such data in the project. Specifies any limitations on the use of the data. |
| Data Management | <ul style="list-style-type: none"> Describes the project data management scheme, tracing the data path from generation in the field or laboratory to their final use or storage. Describes or references the standard record-keeping procedures, document control system, and the approach used for data storage and retrieval on electronic media. |

Appendix B: CLP Sample Collection Guidelines for VOAs in Soil by SW-846 Method 5035A

A. Preferred Options for the Contract Laboratory Program (CLP) are Options 1, 2, and 3:



Soil samples must be placed on their sides prior to being frozen.

Option 1.

Closed-system Vials:

Container - tared or preweighed 40 mL VOA Vials containing a magnetic stir bar.

Collect 5 g of soil per vial (iced or frozen in the field).

| | |
|--|---|
| Regular Samples | 3 Vials - Dry (5 g soil per vial) <u>1 Vial - Dry (filled with soil, no headspace)</u> 4 Total Vials |
| Regular Samples Requiring QC Analysis | 9 Vials - Dry (5 g soil per vial) <u>1 Vial - Dry (filled with soil, no headspace)</u> 10 Total Vials |

Option 2.

Closed-system Vials Containing Water:

Container - tared or pre-weighed 40 mL VOA vials containing a magnetic stir bar and 5 mL water.

Collect 5 g of soil per vial (iced or frozen in the field).

| | |
|--|---|
| Regular Samples | 2 Vials with water added (5 g soil and 5 mL water per vial) 1 Vial - Dry (5 g soil in vial) <u>1 Vial - Dry (filled with soil, no headspace)</u> 4 Total Vials (2 with water and 2 dry) |
| Regular Samples Requiring QC Analysis | 6 Vials with water added (5 g soil and 5 mL water per vial) 5 Vials - Dry (5 g soil per vial) <u>1 Vial - Dry (filled with soil, no headspace)</u> 12 Total Vials (6 with water and 6 dry) |

Option 3.

Coring Tool used as a Transport Device

Container - 5 g Samplers or equivalent.



All Samplers should be iced or frozen in the field and bagged individually.

| | |
|--|--|
| Regular Samples | 3 Samplers (5 g soil per Sampler) <u>1 Vial - Dry (filled with soil, no headspace)</u> 4 Total (3 Samplers and 1 Vial) |
| Regular Samples Requiring QC Analysis | 9 Samplers (5 g soil per Sampler) <u>1 Vial - Dry (filled with soil, no headspace)</u> 10 Total (11 Samplers and 1 Vial) |

B. Options 4, 5, and 6 are NOT preferred options for the CLP:

Option 4.

Closed-system Vials:

Container - tared or preweighed 40 mL VOA Vials containing a magnetic stir bar and preservative.

Collect 5 g of soil per vial and add Sodium bisulfate (NaHSO_4) preservative (5 mL water + 1 g NaHSO_4) - iced or frozen in the field.

Caution: This option is NOT a Preferred Option for the CLP because:

NaHSO_4 preservation creates low pH conditions that will cause the destruction of certain CLP target analytes (e.g., vinyl chloride, trichloroethene, trichlorofluoromethane, cis- and trans-1,3-dichloropropene). Projects requiring the quantitation of these analytes should consider alternative sample preservation methods. NaHSO_4 also cannot be used on carbonaceous soils. Check the soil before using this method of collection! Soil can be checked by placing a test sample in a clean vial, then adding several drops of NaHSO_4 solution. If the soil bubbles, use Option 4b and note this issue on the TR/COC Record.

Option 4a. Samples preserved in the field

| | |
|--|---|
| Regular Samples | 2 Vials with NaHSO_4 preservative added (5g soil per vial) |
| | 1 Vial without NaHSO_4 preservative added (5g soil per vial) |
| | <u>1 Vial - Dry (filled with soil, no headspace)</u> |
| | 4 Total Vials (2 with NaHSO_4 preservative and 2 without) |
| Regular Samples Requiring QC Analyses | 4 Vials with NaHSO_4 preservative added (5g soil per vial) |
| | 5 Vials without NaHSO_4 preservative added (5 g soil per vial) |
| | <u>1 Vial - Dry (filled with soil, no headspace)</u> |
| | 10 Total Vials (4 with NaHSO_4 and 6 without) |

Option 4b. Samples are preserved by the laboratory (No NaHSO_4 preservative is added to these samples in the field).

| | |
|--|--|
| Regular Samples | 3 Vials - Dry (5 g soil per vial) |
| | <u>1 Vial - Dry (filled with soil, no headspace)</u> |
| | 4 Total Vials |
| Regular Samples Requiring QC Analyses | 9 Vials - Dry (5 g soil per vial) |
| | <u>1 Vial - Dry (filled with soil, no headspace)</u> |
| | 10 Total Vials |

Option 5.

Methanol Preservation (medium-level analysis only):

Container - tared or pre-weighed 40 mL VOA vials containing 5-10 mL methanol.

Collect 5 g of soil per vial (iced in the field).

Caution: This is NOT a preferred option for the CLP because:

Samples preserved with methanol can only be analyzed by the medium-level method. Low-level Contract Required Quantitation Limit (CRQLs) cannot be achieved when samples are preserved this way.

Additional problems associated with use of methanol as a preservative in the field include:

- Possible contamination of the methanol by sampling-related activities (e.g., absorption of diesel fumes from sampling equipment);
- Leakage of methanol from the sample vials during shipping, resulting in loss of VOAs prior to analysis.

| | |
|--|---|
| Regular Samples | 2 Vials (5 g soil and 5-10 mL methanol per vial) <u>1 Vial - Dry (filled with soil, no headspace)</u> 3 Total Vials (2 with methanol and 1 dry) |
| Regular Samples Requiring QC Analysis | 6 Vials (5 g soil and 5-10 mL methanol per vial) <u>1 Vial - Dry (filled with soil, no headspace)</u> 7 Total Vials (6 with methanol and 1 dry) |



If shipping samples containing methanol as a preservative, a shipping label must be used to indicate methanol. This label must also contain the United Nations (UN) identification number for methanol (UN 1230), and indicate Limited Quantity.

Option 6.**Glass Containers filled with sample - No Headspace:****Container - 4 oz Glass Jars.**

Glass container filled with soil with no headspace and iced.

Caution: This is NOT a preferred option for the CLP because:

Samples collected in this manner lose most of their volatile analytes prior to analysis when the sample containers are opened and sub-sampled in the laboratory. This option is only available due to Regional requirements.

| | |
|--|--|
| Regular Samples | 2 Glass Jars (4 oz) filled with sample, no headspace <u>1 Vial - Dry (filled with soil, no headspace)</u> 3 Total Containers |
| Regular Samples Requiring QC Analysis | 2 Glass Jars (4 oz) filled with sample, no headspace <u>1 Vial - Dry (filled with soil, no headspace)</u> 3 Total Containers |

C. Caution:

1. Extreme care must be taken to ensure that frozen samples do not break during shipment.
2. Before adding soil to pre-weighed vials containing a stir bar, weigh the vials to confirm the tared weight. If the weight varies by more than 0.1 g, record the new weight on the label and the sample documentation. Do NOT add labels to these vials once the tared weight has been determined/confirmed.

D. Dry Samples:

All options include taking a sample in a dry 40 mL VOA vial (or a 4 oz wide mouth jar) with no headspace. No additional water, NaHSO₄, or methanol is added to this sample. This sample is taken to determine moisture content; therefore, it does not need to be tared or have a stir bar.

E. Iced or Frozen Samples:

1. Iced means cooled to 4°C (±2°C) immediately after collection.
2. Frozen means cooled to between -7°C and -15°C immediately after collection.

F. Sample Delivery:

CLP strongly recommends that all samples reach the laboratory by COB the next day after sample collection.

G. Notes:

1. For Option 4, samples can be preserved with NaHSO₄ either:
 - In the field; or
 - In the laboratory upon receipt. In this case, the sampler should put the following information in the Preservation Column of the TR/COC Record - "To be preserved at lab with NaHSO₄". This Regional Request should also be communicated to SMO so that the laboratory can be notified.
2. Regional QAPPs may require the use of Option 5. Please note that this option is for medium-level analysis ONLY.
3. If water, methanol, or NaHSO₄ preservative is added to the vials in the field, a field blank containing the appropriate liquid used in the vials should be sent to the laboratory for analysis.

H. Number of Containers Rationale:

The rationale for the number of containers (vials or samplers) required for the field sample and the required laboratory QC for each option is given as follows:

Option 1.

Rationale for Regular Vials:

- 1 vial for low-level analysis (water purge)
- 1 vial for backup low-level analysis
- 1 vial for medium-level analysis (methanol extraction)

Rationale for QC Vials:

- 2 vials for MS and MSD low-level analysis
- 2 vials for MS and MSD medium-level analysis
- 2 vials for backup (MS and MSD) low-level or medium-level analysis

Option 2.**Rationale for Regular Vials:**

1 vial for low-level analysis (water purge)
 1 vial for back up low-level analysis
 1 vial dry for medium-level analysis (methanol extraction)

Rationale for QC Vials:

2 vials for MS and MSD low-level analysis
 2 vials for MS and MSD medium-level analysis
 2 vials for backup (MS and MSD) low-level or medium-level analysis

Medium-level: Analysis

Methanol will be added in the laboratory

Option 3.**Rationale for Regular Samples:**

1 sampler for low-level analysis (water purge)
 1 sampler for back up low-level analysis
 1 sampler for medium-level analysis (methanol extraction)

Rationale for QC Samples:

2 samplers for MS and MSD low-level analysis
 2 samplers for backup MS and MSD low-level analysis
 2 samplers for MS and MSD medium-level analysis
 2 samplers for backup MS and MSD medium-level analysis

Option 4a (NaHSO₄ added in the field).**Rationale for Regular Vials:**

1 vial with water for low-level analysis (water purge)
 1 vial with water for backup low-level analysis
 1 vial dry for medium-level analysis (methanol extraction)

Rationale for QC Vials:

2 vials with water for MS and MSD low-level analysis
 2 vials dry for MS and MSD medium-level analysis
 2 vials for backup (MS and MSD) low-level or medium-level analysis

Option 4b (NaHSO₄ added in the laboratory).**Rationale for Regular Vials:**

1 vial for low-level analysis (water purge)
 1 vial for backup low-level analysis
 1 vial for medium-level analysis (methanol extraction)

Rationale for QC Vials:

2 vials for MS and MSD low-level analysis
 2 vials for MS and MSD medium-level analysis
 2 vials for backup (MS and MSD) low-level or medium-level analysis

Option 5.**Rationale for Regular Samples:**

1 vial for regular medium-level analysis
 1 vial for back up medium-level analysis

Rationale for QC Samples:

2 samples for MS and MSD
 2 samples for backup MS and MSD

Option 6.

In this option, all Regular and QC samples for both low-level and medium analysis are taken as subsamples from the same container.

| | |
|---------------------------------------|--|
| Rationale for Regular Analysis | 1 glass jar for low-level analysis and medium-level analysis 1 glass jar for backup low-level analysis and medium-level analysis |
| Rationale for QC Analysis: | 1 glass jar for low-level analysis and medium-level analysis 1 glass jar for backup low-level analysis and medium-level analysis |

Appendix C: General CLP Sample Collection Guidelines VOAs in Water



Regional guidance and/or specific Project Plan requirements will supersede the guidelines listed below.

Collect the following:

- At least two 40 mL glass containers with polytetrafluoroethylene (PTFE)-lined septa and open top screw-caps that are filled to capacity with no air bubbles, preserved to a pH of 2 with HCl, and cooled to 4°C ($\pm 2^\circ\text{C}$) immediately after collection. **DO NOT FREEZE THE SAMPLES.**
- If Selected Ion Monitoring (SIM) analysis is requested, at least two additional 40 mL glass containers with PTFE-lined septa and open top screw-caps that are filled to capacity with no air bubbles, preserved to a pH of 2 with HCl, and cooled to 4°C ($\pm 2^\circ\text{C}$) immediately after collection.

Test for Carbonates, Residual Chlorine, Oxidants, and Sulfides:

- It is very important that samplers obtain Regional guidance when testing and ameliorating for:
 - Carbonates;
 - Residual chlorine (e.g., municipal waters or industrial waste waters that are treated with chlorine prior to use or discharge); or
 - Oxidants.
- VOA samples containing carbonates react with the acid preservative causing effervescence (due to formation of carbon dioxide), which can cause loss of volatile analytes.
- Residual chlorine present in VOA samples can continue to react with dissolved organic matter. This continuous reaction may lead to inaccurate quantitation of certain analytes present in the sample at the time of collection.
- Residual chlorine and oxidants present in VOA samples can cause degradation of certain volatile analytes (e.g., styrene).

Perform the following for *Pre-Preserved Vials*:

1. Pour the sample slowly down the edge of the sample vial to avoid excess aeration or agitation of the sample during filling.
2. Fill the vial completely so that a reverse (convex) meniscus is present and ensure that there are no air bubbles present (either in the body or especially at the top of the vial).
3. Place the septum on the vial so that the PTFE side is in contact with the sample, and then firmly tighten the cap.
4. Gently flip the vial a few times to ensure that the sample is mixed with the acid preservative.
5. While holding the vial upright, gently tap the sample to check for air bubbles (either in the body or especially at the top of the vial).
6. If air bubbles are present, discard the sample and select a new vial in which to recollect a new sample. Repeat Steps 1 - 5 above.
7. Do NOT mix or composite samples for VOAs.
8. Cool sample to a temperature of 4°C ($\pm 2^\circ\text{C}$). Samplers should begin the cooling process in the field as samples are being collected. Double-bagged ice should be used. **DO NOT FREEZE WATER SAMPLES.**
9. Immediately transfer the vial to the sample shuttle (device that contains a “set” of VOA vials) once it has been collected. Do **NOT** allow ice to touch the vials.

Perform the Following for *Empty Vials*:

1. Rinse the vial with sample water prior to actual sample collection and preservation.



Regions vary in their approach to pre-rinsing and/or re-using sample vials (e.g., some Regions do not recommend pre-rinsing and/or re-use of pre-cleaned containers using sample water). Be sure to follow Regional guidance.

2. Add 1-2 mL of acid preservative to the vial. Check to ensure that the sample you are collecting requires a preservative (follow Regional guidance).
3. Pour the sample slowly down the edge of the sample vial to avoid excess aeration and agitation of the sample.
4. Fill the vial completely so that a reverse (convex) meniscus is present and ensure that there are no air bubbles present (either in the body or especially at the top of the vial).
5. Place the septum on the vial so that the PTFE side is in contact with the sample, and then firmly tighten the cap.
6. Gently flip the vial a few times to ensure that the sample is mixed with the acid preservative.
7. While holding the vial upright, gently tap the vial to check for air bubbles (either in the body or especially at the top of the vial).
8. If air bubbles are present, discard the sample and recollect a new sample using the same sample vial. Repeat Steps 1 - 7 above.
9. Check the recollected sample for air bubbles. If air bubbles are present, additional sample water may be added to the vial to eliminate air bubbles. If there are air bubbles after three consecutive attempts to eliminate air bubbles by the addition of sample water, the entire sample and sample vial should be discarded and a new sample collected.
10. Do NOT mix or composite samples for VOAs.
11. Cool sample to a temperature of 4°C ($\pm 2^\circ\text{C}$). Samplers should begin the cooling process in the field as samples are being collected. Double-bagged ice should be used. DO NOT FREEZE WATER SAMPLES.
12. Immediately transfer the vial to the sample shuttle (device which contains a “set” of VOA vials) once it has been collected. Do NOT allow ice to touch the vials.

Things to Remember:

- Samples must be shipped as soon as possible, preferably on the same day as sample collection to avoid exceeding sample holding times. If overnight transit is not possible, samples should be maintained at 2 - 4°C until they are shipped to the laboratory.
- If samples are not preserved (a requirement for certain analytes), the technical holding time is shortened to 7 days.

Appendix D: Sampling Techniques and Considerations

During a sampling event, the sampler is expected to follow prescribed sampling techniques. The sampler should also be aware of any special sampling considerations, contaminant issues, and sample compositing and mixing methods that could affect their sampling efforts.



Regional guidance will take precedence over any of the techniques and considerations listed below.

D.1 General Sampling Techniques

Information regarding surface water, sediment, soil, and groundwater sampling can be found in many documents including, but not limited to, the following sources:

- Compendium of ERT Surface Water and Sediment Sampling Procedures, EPA/540/P-91/005;
- Compendium of ERT Soil Sampling and Surface Geophysics Procedures, EPA/540/P-91/006;
- Compendium of ERT Groundwater Sampling Procedures, EPA/540/P-91/007;
- Quality Assurance Sampling Plan for Environmental Response (QASPER) software, Version 4.1, ERT; and
- *Requirements for the Preparation of Sampling and Analysis Plans*; United States Army Corps of Engineers, February 1, 2001, EM 200-1-3.

When working with potentially hazardous materials, samplers should follow USEPA and OSHA requirements, specific health and safety procedures, and DOT requirements.

D.2 Special Sampling Considerations

Samplers should refer to Regionally-developed SOPs to obtain specific procedures for properly collecting and preserving samples in the field. For additional guidance regarding sampling for VOAs in soil and water, see Appendices B and C. Samplers should obtain Regional guidance when testing and ameliorating for:

- Carbonates in VOA soil and water;
- Residual chlorine in VOA soil and water, or cyanide water;
- Oxidants in VOA soil and water; or
- Sulfides in cyanide.

D.3 Contaminant Sampling

Certain compounds can be detected in the parts-per-billion (ppb) and/or parts-per-trillion (ppt) range. Extreme care **MUST** be taken to prevent cross-contamination of these samples. The following precautions should be taken when trace contaminants are a concern:

- Disposable gloves should be worn each time a different location is sampled.
- When collecting both surface water and sediments, surface water samples should be collected first. This reduces the chance of sediment dispersal into surface water, and the resulting loss of surface water sample integrity.
- Sampling should occur in a progression from the least to the most contaminated area, if this information is known to the sampling team.
- Samplers should use equipment constructed of PTFE, stainless steel, or glass that has been properly pre-cleaned for collection of samples for trace organic and/or inorganic analyses. Equipment constructed of plastic or polyvinyl chloride (PVC) should **NOT** be used to collect samples for trace organic compound analyses.
- Equipment constructed of stainless steel should **NOT** be used to collect samples for trace metals analysis.

D.4 Sample Compositing

Sample compositing is a site-specific activity that must be conducted according to the SAP. Compositing is typically used for large sites under investigation to improve the precision (i.e., lower the variance) of the estimated average contaminant concentrations. **Samples for VOA analysis should NOT be composited to minimize loss of VOAs/analytes.**

Composite samples consist of a series of discrete grab samples that are mixed together to characterize the average composition of a given material. The discrete samples are usually of equal volume, but may be weighted to reflect an increased flow or volume. Regardless, all discrete samples must be collected in an identical manner and the number of grab samples forming a composite should be consistent. There are several compositing techniques that may be required such as:

- Flow-proportioned – Collected proportional to the flow rate during the compositing period by either a time-varying/constant volume or a time-constant/varying volume method. This technique is usually associated with wastewater or storm water runoff sampling.
- Time – Composed of a varying number of discrete samples collected at equal time intervals during the compositing period. This technique is typically used to sample wastewater and streams, and in some air sampling applications.
- Areal – Collected from individual grab samples collected in an area or on a cross-sectional basis. Areal composites are comprised of equal volumes of grab samples where all grabs are collected in an identical manner. This technique is typically used for estimating average contaminant concentrations in soils or sediments. This technique is useful when contaminants are present in nugget form (i.e., TNT chunks, lead shot, etc.), thus exhibiting large differences in concentration over a small sample area.
- Vertical – Collected from individual grab samples but taken from a vertical cross section. Vertical composites are comprised of equal volumes of grab samples where all grab samples are collected in an identical manner. Examples would include vertical profiles of a soil borehole or sediment columns.
- Volume – Collected from discrete samples whose aliquot volumes are proportional to the volume of sampled material. Volume composites are usually associated with hazardous waste bulking operations where the sample represents combined or bulked waste.

When compositing solid samples (i.e., sediment, soil, or sludge) for analysis of compounds present in trace quantities, use a stainless steel or PTFE bowl and spatula.

D.5 Sample Mixing and Homogenizing

Mixing of the sample for the remaining parameters is necessary to create a representative sample media. It is extremely important that solid samples be mixed as thoroughly as possible to ensure that the sample is as representative as possible of the sample location. Please refer to the project-specific SAP regarding instructions on removal of any extraneous materials (e.g., leaves, sticks, rocks, etc.). The mixing technique will depend on the physical characteristics of the solid material (e.g., particle size, moisture content, etc.). The mixing container should be large enough to hold the sample volume and accommodate the procedures without spilling. Both the mixing container (generally a bowl or tray) and the mixing implement should be properly decontaminated before use. Samples should be homogenized according to procedures listed in the project-specific SAP.

Samples for VOA analysis should not be mixed to minimize loss of volatile analytes.


Table D-1 provides a short procedure for mixing a soil sample with a small particle size (less than 1/4 in) and filling sample containers in the field.

Table D-1. Mixing a Sample and Filling Sample Containers

| Step | Action |
|------|--|
| 1 | Roll the contents of the compositing container to the middle of the container and mix. |
| 2 | Quarter the sample and move to the sides of the container. |
| 3 | Mix each quarter individually, then combine and mix OPPOSITE quarters, then roll to the middle of the container. |
| 4 | Mix the sample once more, and then quarter the sample again. |
| 5 | Mix each quarter individually, then combine and mix ADJACENT corners, then roll to the middle of the container. The goal is to achieve a consistent physical appearance before sample containers are filled. |
| 6 | Flatten piled material into an oblong shape. |
| 7 | Using a flat-bottomed scoop, collect a strip of soil across the entire width of the short axis and place it into a sample container. |
| 8 | Repeat Step 7 at evenly-spaced intervals until the sample containers are filled. |
| 9 | Record the approximate quantity of each subsample in the field log book. |


Appendix E: Sampling Checklists

Appendix E-1: Personnel Preparation Checklist (Page 1 of 1)


| Personnel Briefing | Yes | No | Comments: |
|---|-----|----|-----------|
| 1. Did you review sampling team responsibilities and identify individual(s) responsible for corrective actions? | | | |
| 2. Did you ensure that you have met the appropriate personal safety and protection requirements? | | | |
| 3. Did you identify sampling locations and receive permission to access them, as appropriate? | | | |
| 4. Did you contact the appropriate utility companies PRIOR to the start of sampling? | | | |
|  <p>By law, utility companies must be contacted prior to the start of digging/sampling so that any underground utilities (gas lines, water lines, electrical lines, etc.) can be marked. A list of one-call centers for each state may be found at: http://www.digsafely.com/contacts.htm.</p> | | | |
| 5. If sampling on private property, do you have sample receipts to provide to the property owner for all samples taken and removed from the property? | | | |
| 6. Have you determined the number and type of samples to be collected? | | | |
| 7. Did you review sample collection methods? | | | |
| 8. Have you reviewed sample container requirements? | | | |
| 9. Did you review decontamination requirements, procedures, and locations? | | | |
| 10. Did you determine holding times and conditions? | | | |
| 11. Did you determine Performance Evaluation (PE) and Quality Control (QC) sample requirements? | | | |
| 12. Have you obtained shipping cooler temperature blanks, if required? | | | |
| 13. Did you review sample label and tag requirements? | | | |
| 14. Did you review Traffic Report/Chain of Custody (TR/COC) Record and custody seal requirements? | | | |
| 15. Have you obtained the laboratory name, shipping addresses, and telephone number? | | | |
| 16. Did you review cooler return instructions? | | | |
| 17. Have you obtained shipping company information (name, telephone number, account number, pickup schedule)? | | | |
| 18. Have you obtained shipping schedules? | | | |
| 19. Did you review shipment reporting requirements and the appropriate contact names and telephone numbers for reporting? | | | |
| 20. Have you included any sampler comments regarding sampling issues (e.g., low volumes, matrix, suspected concentrations based on field measurements)? | | | |

Appendix E-2: General Sample Collection Checklist




(Page 1 of 1)

| General Sample Collection | Yes | No | Comments: |
|---|-----|----|-----------|
| 1. Did you identify and mark the sampling location with buoys, flags, or stakes according to the sampling plans, maps, and grids? | | | |
| 2. If the sampling location is inaccessible, did you contact the appropriate field or Regional personnel for instructions? | | | |
| 3. Did you use the correct sampling equipment? | | | |
| 4. Did you follow the correct decontamination procedures? | | | |
| 5. Did you follow the correct collection procedures? | | | |
| 6. Did you use the correct sample containers for each sample collected? | | | |
| 7. Did you collect the correct volume for each sample? | | | |
| 8. Did you collect the correct type of sample, including primary samples and Quality Control (QC) samples? | | | |
| 9. Did you properly preserve each sample collected? | | | |
| 10. Did you correctly document and label each sample with all necessary information?  Under no circumstances should the site name appear on any documentation being sent to the laboratory. | | | |
| 11. If sampling on private property, did you provide a sample receipt to the owner of the property for all samples taken and removed from the property? | | | |

Appendix E-3: Completing Field Logbook Checklist (Page 1 of 1)

| Completing Field Logbook | Yes | No | Comments: |
|--|-----|----|-----------|
| 1. Did you use waterproof ink when writing in the field logbook? | | | |
| 2. Did you document sampling project information such as: <ul style="list-style-type: none"> • Project name, ID, and location; • Names of samplers; • Geological observations, including maps; • Atmospheric conditions; • Field measurements; and • Sampling dates, times, and locations? <div style="display: flex; align-items: center; margin-top: 10px;">  <p>Under no circumstances should the site name appear on any documentation being sent to the laboratory.</p> </div> | | | |
| 3. Did you record sampling activity information such as: <ul style="list-style-type: none"> • Sampling dates and times; • Sample identifications; • Sample matrices; • Sample descriptions (e.g., odors and/or colors); • Number of samples taken; • Sampling methods/equipment; and • Description of QC samples? | | | |
| 4. Did you document any and all deviations from the sampling plan? | | | |
| 5. Did you document any and all difficulties in sampling and/or any unusual circumstances? | | | |
| 6. Were all errors corrected by crossing a line through the error, initialing the error, dating the error, and then adding the correct information? | | | |

Appendix E-4: Completing Handwritten Sample Labels Checklist (Page 1 of 1)

| Completing Handwritten Sample Labels | Yes | No | Comments: |
|--|-----|----|-----------|
| 1. Did the Region provide CLP Sample Numbers and SMO-assigned Case Numbers? | | | |
| 2. If additional CLP Sample Numbers were needed, did you contact the appropriate Regional personnel? | | | |
| 3. Were the CLP Sample Numbers and SMO-assigned Case Numbers on the labels correct? Organic CLP Sample Numbers begin with the Regional letter code, followed by letters and numbers. Inorganic CLP Sample Numbers begin with "M", followed by the Regional letter code, and then letters and numbers.  The following characters are not used in generating CLP Sample Numbers and should never appear on any paperwork sent to the laboratory: I; O; U; and V. Also, the last character of a CLP Sample Number will never be a letter. | | | |
| 4. Were samples uniquely numbered and designated to only one sample?  Samples collected for total metal and dissolved metal analyses must receive separate, unique, CLP Sample Numbers. | | | |
| 5. Were Quality Control (QC) samples numbered accordingly? | | | |
| 6. Were the specific requirements followed for total and dissolved metals analysis, QC and Performance Evaluation (PE) samples, and SW-846 Method 5035A? | | | |
| 7. Were all temperature blanks labeled with "TEMPERATURE BLANK"? | | | |
| 8. Was a sample label containing the CLP Sample Number, SMO-assigned Case Number, location, concentration, preservative, and the fraction/analysis, attached to each sample bottle or container as the sample was collected?  Under no circumstances should the site name appear on any documentation being sent to the laboratory. | | | |
| 9. Was clear tape placed over the sample labels to protect the labels from moisture and to help the labels adhere to the sample bottle? | | | |
| 10. Were all errors corrected by crossing a line through the error, initialing the error, dating the error, and then adding the correct information? | | | |

Appendix E-5: Completing Handwritten Sample Tags & Custody Seals Checklists

(Page 1 of 1)



| Completing Handwritten Sample Tags | Yes | No | Comments: |
|---|-----|----|-----------|
| 1. Was waterproof ink used on the sample tags? | | | |
| 2. If Regionally required for individual sample containers, was the project code on the sample tag completed? | | | |
| 3. Was the station number on the sample tag completed? | | | |
| 4. Was the date filled in using the format MM/DD/YYYY? | | | |
| 5. Was the time of sample collection indicated in military time format HH:MM? | | | |
| 6. Was the box checked indicating composite or grab sample? | | | |
| 7. Was the station location on the sample tag completed? | | | |
| 8. Did you indicate whether or not the sample was preserved by checking "yes" or "no?" | | | |
| 9. Was the appropriate analysis indicated on the sample tag? | | | |
| 10. Were the appropriate CLP Sample Number and SMO-assigned Case Number indicated and cross-referenced with the numbers on the sample label? | | | |
| 11. Did you sign the sample tags? | | | |
| <div></div> 12. Did you attach the sample tag to the neck of the sample bottle with string, stretch string, or wire (recommended method)? Do NOT use wire to attach a sample tag to a metal sample. | | | |
| 13. Were all errors corrected by crossing a line through the error, initialing the error, dating the error, and then adding the correct information? | | | |
| Completing Custody Seals | Yes | No | Comments: |
| 1. Did you sign and date the custody seal? | | | |
| 2. Did you attach a completed custody seal to the sample bottle, container, or plastic bag, placing the seal over the cap or lid of each sample bottle or container or on the bag opening such that it will be broken if the sample bottle, container, or bag is opened or tampered with? | | | |
| 3. As appropriate, did you attach the completed custody seal to the sample shipping container or cooler, placing the seal such that it will be broken if the container or cooler is opened or tampered with? | | | |
| 4. Were all errors corrected by crossing a line through the error, initialing the error, dating the error, and then adding the correct information? | | | |

Appendix E-6: Packing Sample Container Checklist (Page 1 of 1)

| Packing Sample Container | Yes | No | Comments: |
|---|-----|----|-----------|
| <p>1. Did you follow all State, Federal, Department of Transportation (DOT), and International Air Transportation Association (IATA) regulations governing the packaging of environmental and hazardous samples?</p> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> Note </div> <p>If samples contain methanol preservation (e.g., samples to be analyzed by SW-846 Method 5035A), refer to the packaging instructions in Appendix A.</p> | | | |
| 2. Were all CLP Sample Numbers, SMO-assigned Case Numbers, fractions/analyses, labels, tags, and custody seals attached to the correct sample containers? | | | |
| 3. Was an inventory conducted of CLP Sample Numbers, SMO-assigned Case Numbers, fractions/analyses, and containers, and verified against the TR/COC Records? | | | |
| 4. Were the correct number and type of Performance Evaluation (PE) and Quality Control (QC) samples collected? | | | |
| 5. Were all sample containers sealed in clear plastic bags with the sample label and tag visible through the packaging? | | | |
| 6. Were all soil/sediment samples known to contain dioxin securely enclosed in metal cans (e.g., paint cans) with the lids sealed? | | | |
| 7. Was suitable absorbent packing material placed around the sample bottles or containers? | | | |
| 8. Were the outsides of metal containers labeled properly with the CLP Sample Number, SMO-assigned Case Number, and the fraction/analysis of the sample inside? | | | |

Appendix E-7: Packing Shipping Container Checklist

(Page 1 of 1)

| Packing Shipping Container | Yes | No | Comments: |
|---|-----|----|-----------|
| 1. Were you shipping samples in a clean waterproof metal or hard plastic ice chest or cooler in good condition? | | | |
| 2. Were all non-applicable labels from previous shipments removed from the container? | | | |
| 3. Were all inside and outside drain plugs closed and covered with suitable tape (e.g., duct tape)? | | | |
| 4. Was the inside of the cooler lined with plastic (e.g., large heavy-duty garbage bag)? | | | |
| 5. Was the lined shipping cooler packed with noncombustible absorbent packing material? | | | |
| 6. Were sample containers placed in the cooler in an upright position not touching one another? | | | |
| 7. Was a sample shipping cooler temperature blank included in the cooler? | | | |
| 8. Did the documentation in the cooler only address the samples in that cooler? | | | |
| 9. Was the site name absent from all documentation?  Under no circumstances should the site name appear on any documentation being sent to the laboratory. | | | |
| 10. Was there sufficient packing material around and in between the sample bottles and cans to avoid breakage during transport? | | | |
| 11. If required, was double-bagged ice placed on top and around sample bottles to keep the samples cold at 4°C (± 2° C)?  Do Not Pack Loose Ice Into the Cooler! | | | |
| 12. Was the top of the plastic liner fastened and secured with tape? | | | |
| 13. Was a completed custody seal placed around the top of the fastened plastic liner (if required by the Region)? | | | |
| 14. Were all sample documents enclosed within the cooler (e.g., TR/COC Record and cooler return instructions) in a waterproof plastic bag? | | | |
| 15. Was the plastic bag, containing the documentation, taped to the underside of the cooler lid? | | | |
| 16. Were cooler return instructions and airbills, if required, taped to the underside of the cooler lid? | | | |
| 17. Was the return address of the cooler written with permanent ink on the underside of the cooler lid? | | | |
| 18. Was tape placed around the outside of the entire cooler and over the hinges? | | | |
| 19. Were the completed custody seals placed over the top edge of the cooler so the cooler cannot be opened without breaking the seals? | | | |
| 20. Was the return address label attached to the top left corner of the cooler lid? | | | |
| 21. Were instructional labels attached to the top of the cooler, as necessary (e.g., "This End Up," "Do Not Tamper With," or "Environmental Laboratory Samples")? | | | |
| 22. If shipping hazardous samples, were the correct labels attached to the cooler (e.g., "Flammable Liquids", "Caution", or "Poison")? | | | |
| 23. If shipping samples containing methanol as a preservative (e.g., samples to be analyzed by SW-846 Method 5035A), was a label used to indicate methanol, the United Nations (UN) identification number for methanol (UN 1230), and Limited Quantity? | | | |

Appendix E-8: Shipping & Reporting CLP Samples Checklist
(Page 1 of 1)

| Shipping CLP Samples | | Yes | No | Comments: |
|-----------------------|--|-----|----|-----------|
| 1. | Did you follow all State, Federal, Department of Transportation (DOT), and International Air Transportation Association (IATA) regulations governing the shipment of environmental and hazardous samples? | | | |
| 2. | Was a separate airbill filled out for each cooler being shipped? | | | |
| 3. | Was the airbill filled out completely, including correct laboratory name, address, and telephone number, identification of recipient as "Sample Custodian," and appropriate delivery option (e.g., overnight or Saturday)? | | | |
| 4. | Was the completed airbill attached to the top of the cooler with the correct laboratory address? | | | |
| 5. | If more than one cooler was being shipped to the same laboratory, were they marked as "1 of 2," "2 of 2," etc.? | | | |
| 6. | Were the samples being shipped "overnight" through a qualified commercial carrier? | | | |
| Reporting CLP Samples | | Yes | No | Comments: |
| 1. | Did you contact the Contract Laboratory Program Sample Management Office (SMO) on the same day samples were shipped? | | | |
| 2. | If the samples were shipped after 5:00 PM Eastern Time (ET), were they reported to the RSCC (or designee) or to SMO by 8:00 AM ET the following business day? | | | |
| 3. | Did you notify the RSCC (or designee) or SMO so that SMO will receive the delivery information by 3:00 PM ET on Friday for sample shipments that will be delivered to the laboratory on Saturday? | | | |
| 4. | Did you provide the RSCC (or designee) or SMO with: <ul style="list-style-type: none"> • Your name, phone number, and Region number; • Case Number of the project; • Exact number of samples, matrix(ces), concentration(s), and type of analysis; • Laboratory(ies) to which the samples were shipped; • Carrier name and airbill number; • Date of shipment; • Date of next shipment; and • Any other information pertinent to the shipment? | | | |

Appendix F: Glossary

Analyte -- The element, compound, or ion that is determined in an analytical procedure; the substance or chemical constituent of interest.

Analytical Services Branch (ASB) -- Directs the Contract Laboratory Program (CLP) from within the United States Environmental Protection Agency's (USEPA's) Office of Superfund Remediation and Technology Innovation (OSRTI) in the Office of Solid Waste and Emergency Response (OSWER).

Aroclor -- Polychlorinated biphenyls (PCBs) or a class of organic compounds with 1 to 10 chlorine atoms attached to biphenyl and a general chemical formula of $C_{12}H_{10-x}Cl_x$. PCBs, commercially produced as complex mixtures containing multiple isomers at different degrees of chlorination, were marketed in North America under the trade name Aroclor.

Case -- A finite, usually predetermined, number of samples collected over a given time period from a particular site. Case Numbers are assigned by the Sample Management Office (SMO). A Case consists of one or more Sample Delivery Groups (SDGs).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) -- Initiated in December 1980, CERCLA provided broad federal authority to respond directly to the release or possible release of hazardous substances that may endanger human health or the environment. CERCLA also established a trust fund to provide for cleanup when no responsible party could be identified; hence CERCLA is commonly referred to as "Superfund".

Contract Laboratory Program (CLP) -- A national program of commercial laboratories under contract to support the USEPA's nationwide efforts to clean up designated hazardous waste sites by providing a range of chemical analytical services to produce environmental data of known and documented quality. This program is directed by USEPA's Analytical Services Branch (ASB).

Contract Laboratory Program Project Officer (CLP PO) -- Monitors technical performance of the contract laboratories in each Region.

Contract Laboratory Program Sample Management Office (CLP SMO) -- A contractor-operated facility operated under the CLP, awarded and administered by the USEPA, which provides necessary management, operations, and administrative support to the CLP. SMO coordinates and schedules sample analyses, tracks sample shipments and analyses, receives and tracks data for completeness and compliance, and processes laboratory invoices.

Custody Seal -- An adhesive label or tape that is used to seal a sample bottle or container that maintains chain-of-custody and that will break if the sample bottle or container is opened or tampered with.

Cyanide (Total) -- Cyanide ion and complex cyanides converted to hydrocyanic acid (HCN) by reaction in a reflux system of a mineral acid in the presence of magnesium ion.

Data Quality Objective (DQO) -- The requirements established to maintain the quality of the data being collected.

Data Validation -- Data validation is based on Region-defined criteria and limits, professional judgment of the data validator, and (if available) the Quality Assurance Project Plan (QAPP) and Sampling and Analysis Plan (SAP).

Equipment Blank -- A sample used to check field decontamination procedures. See Field Blank.

Field Blank -- Any blank sample that is submitted from the field. Each field blank is assigned its own unique USEPA Sample Number. A Field Blank checks for cross-contamination during sample collection, sample shipment, and in the laboratory. A field blank includes trip blanks, rinsates, equipment blanks, etc.

Field Duplicate -- Checks reproducibility of laboratory and field procedures and indicates non-homogeneity.

Field Operations Reporting Management System (FORMS) II Lite -- A stand-alone, Windows-based software application that enables samplers to automatically create and generate sample documentation both prior to and during a sampling event.

Field QC Sample -- Used to detect for contamination or error in the field.

Field Sample -- Primary sample material taken out in the field from which other samples, such as duplicates or split samples are derived. A field sample can be prepared in the field and sent for analysis in one or multiple containers, and is identified by a unique EPA Sample Number.

Field Sampling Plan (FSP) -- Developed to outline the actual steps and requirements pertaining to a particular sampling event, and explains, in detail, each component of the event to all involved samplers.

Holding Time -- The elapsed time expressed in hours, days, or months from the date of collection of the sample until the date of its analysis.

Contractual -- The lengths of time that the CLP laboratory must follow to comply with the terms of the contract, and are described in the CLP analytical services Statements of Work (SOWs).

Technical -- The maximum lengths of time that samples may be held from time of collection to time of preparation and/or analysis and still be considered valid.

Laboratory Blank -- See Method Blank.

Laboratory Duplicate -- A sample required by the laboratory's contract to check the precision of inorganic analyses.

Laboratory QC Sample -- An additional volume of an existing sample, as required by the laboratory's contract, used to detect contamination or error in the laboratory's practices.

Matrix -- The predominant material of which a sample to be analyzed is composed.

Matrix Spike (MS) -- Sample required by the laboratory's contract to check the accuracy of organic and inorganic analyses. It is an aliquot of a sample (water or soil) that is fortified (spiked) with known quantities of a specific compound and subjected to the entire analytical procedure. See Matrix Spike Duplicate.

Matrix Spike Duplicate (MSD) -- Sample required by the laboratory's contract to check the accuracy and precision of organic analyses. It is a second aliquot of the same matrix as the Matrix Spike (MS) that is spiked to determine the precision of the method. See Matrix Spike.

Method Blank -- An analytical control consisting of all reagents, internal standards and surrogate standards [or System Monitoring Compounds (SMCs) for volatile organic analysis], that is carried throughout the entire analytical procedure. The method blank is used to define the level of laboratory, background, and reagent contamination, also referred to as laboratory blank when defining the level of laboratory contamination.

Performance Evaluation (PE) Sample -- A sample of known composition provided by the USEPA for contractor analysis. Used by USEPA to evaluate contractor performance.

Pesticides -- Substances intended to repel, kill, or control any species designated a "pest", including weeds, insects, rodents, fungi, bacteria, and other organisms. Under the CLP, only organochlorine pesticides are analyzed (e.g., DDT, Dieldrin, Endrin, etc.).

Polychlorinated Biphenyls (PCBs) -- A group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes, and in gas pipeline systems as a lubricant. The sale and new use of PCBs were banned by law in 1979.

Quality Assurance (QA) -- An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

Quality Assurance Project Plan (QAPP) -- Document written to meet requirements outlined in the document *EPA Guidance for Quality Assurance Project Plans* (EPA QA/R-5). Prepared in advance of field activities and used by samplers to develop any subsequent plans such as the Sampling Analysis Plan (SAP) or the Field Sampling Plan (FSP).

Quality Control (QC) -- The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality.

Regional Sample Control Center (RSCC) Coordinator -- In most Regions, coordinates sampling efforts and serves as the central point-of-contact for sampling questions and problems. Also assists in coordinating the level of Regional sampling activities to correspond with the monthly projected demand for analytical services.

Regional Site Manager -- Coordinates the development of data quality objectives and oversees project-specific remedial or removal contractors, State officials, or private parties conducting site sampling efforts.

Rinse Blank -- A sample used to check decontamination procedures. Also see Field Blank.

Routine Analytical Service (RAS) -- The standard inorganic and organic analyses available through the CLP.

Sample -- A discrete portion of material to be analyzed that is contained in single or multiple containers, and identified by a unique Sample Number.

Sample Delivery Group (SDG) -- A unit within a sample Case that is used to identify a group of samples for delivery. An SDG is defined by the following, whichever is most frequent:

- Each Case of field samples received; or
- Each 20 field samples (excluding PE samples) within a Case; or
- Each 7 calendar day period (3 calendar day period for 7-day turnaround) during which field samples in a Case are received (said period beginning with the receipt of the first sample in the SDG).

In addition, all samples and/or sample fractions assigned to an SDG must have been scheduled under the same contractual turnaround time. Preliminary Results have no impact on defining the SDG. Sample may be assigned to SDGs by matrix (e.g., all soil samples in one SDG, all water samples in another) at the discretion of the laboratory.

Sample Label -- An identification label attached to a sample bottle or container to identify the sample.

Sample Number -- A unique number used to identify and track a sample. This number can be recorded on a sample label or written on the sample bottle or container using indelible ink.

Sample Tag -- A tag attached to a sample that identifies the sample and maintains chain-of-custody.

Sampling Analysis Plan (SAP) -- A document that explains how samples are to be collected and analyzed for a particular sampling event.

Semivolatile Organic Analyte (SVOA) -- A compound amenable to analysis by extraction of the sample using an organic solvent.

Statement of Work (SOW) -- A document that specifies how laboratories analyze samples under a particular Contract Laboratory Program (CLP) analytical program.

Superfund -- The program operated under the legislative authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA) that funds and carries out USEPA removal and remedial activities at hazardous waste sites. These activities include establishing the National Priorities List (NPL), investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

Superfund Amendments and Reauthorization Act (SARA) -- The 1986 amendment to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Traffic Report/Chain of Custody (TR/COC) Record -- A record that is functionally similar to a packing slip that accompanies a shipment of goods. Used as physical evidence of sample custody and functions as a permanent record for each sample collected.

Trip Blank -- A sample used to check for contamination during sample handling and shipment from field to laboratory. Also see Field Blank.

Volatile Organic Analyte (VOA) -- A compound amenable to analysis by the purge-and-trap technique. Used synonymously with the term purgeable compound.

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